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Roberto Rodrigues Bueno

STRESS PLACEMENT AND SUFFIX VOWEL PRODUCTION IN ENGLISH POLYSYLLABIC WORDS BY BRAZILIAN LEARNERS

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Orientadora: Prof.ª Dr.ª Rosane Silveira

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_____
Prof[a]. Dr[a]. Anelise Reich Corseuil
Coordenadora do Curso

Banca Examinadora:

_____
Prof.[a] Dr.[a] Rosane Silveira
Presidente e Orientadora
Universidade Federal de Santa Catarina

_____
Prof.[a] Dr.[a] Andressa Brawerman Albini
Universidade Federal Tecnológica do Paraná

_____
Prof.[a] Dr.[a] Denise Cristina Kluge
Universidade Federal do Paraná

_____
Prof.[a] Dr.[a] Maria Ester Wollstein Moritz
Universidade Federal de Santa Catarina

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ABSTRACT

This research aimed to investigate how factors such as syllable structure, stress patterns, L1 interference, word frequency, word familiarity, and level of proficiency might affect stress placement and the production of the vowels in English neutral suffixes. For that, three production tests were designed: 1) Test A brings an English stressed vowel /ʌ/ and an unstressed vowel /ə/ in different words, whereas 2) Test B was designed in order to guarantee the presence of two English words carrying the unstressed suffixes ("-al" and "-able"). Both tests observed the stress pattern and quality of the vowel, their immediate contexts, and the primary stress in the words. Finally, 3) Test C looked at the correlation between vowel quality and stress placement present in the Portuguese vowel "a" in its stressed and unstressed positions. The two Portuguese vowels were also acoustically analyzed in the same manner as vowels present in the previous tests. This study showed that all three experiments indicated significant results for some of the tests. For example, word frequency and familiarity yielded a moderated correlation, while the results of familiarity and stress placement showed non-significant correlations. Likewise, the result of the correlation between word frequency and stress placement was significant in terms of vowel duration and vowel quality in the two English tests. In sum, the study showed that BP learners of English produce different vowels for the stresses and unstressed positions, although the quality (first and second formant measures) and the duration of these vowels differ from those produced by English native speakers.

Keywords: Vowel quality. Duration. Stress placement. Frequency. Familiarity.

RESUMO

Esta pesquisa teve como objetivo investigar como fatores como estrutura de sílaba, padrões de acentuação, a interferência da L1, a frequência das palavras, familiaridade de palavras e nível de proficiência podem afetar a colocação do acento e da produção das vogais átonas em sufixos neutros do Inglês. Para isso, três testes foram desenvolvidos: 1) Teste A traz a vogal acentuada /ʌ/ e a vogal átona /ə/ em palavras distintas, enquanto 2) o Teste B foi desenvolvido e aplicado a fim de garantir a presença de dois sufixos não acentuados do inglês ("-al" e "-able"). Ambos os testes observam o padrão acentual e a qualidade da vogal, além do contexto anterior e posterior e a posição do acento primário nas palavras. Por fim, 3) Teste C procura ver a correlação da qualidade vocálica e acentuação da vogal "a" do português brasileiro em posições tônicas e átonas. As duas vogais do português também foram analisadas acusticamente do mesmo modo que as vogais dos testes anteriores. O estudo mostrou que os três experimentos apresentaram resultados significativos para alguns dos testes. Por exemplo, a correlação de frequência de uso e familiaridade apresentou correlação moderada, enquanto familiaridade e acertos de acentuação não obteve resultado significativo. O resultado da correlação de frequência de uso e acertos de acentuação foi significativo em termos de duração vocálica e qualidade da vogal em ambos os testes do inglês. De modo geral, pode-se afirmar que o estudo mostrou que falantes do português brasileiro, ao falar inglês, produzem vogais distintas em posições tônica e átona. Contudo, a qualidade vocálica (as medidas de F1 e F2) e duração destas vogais diferem daquelas produzidas por falantes nativas do inglês.

Palavras-Chave: Qualidade vocálica. Duração. Acentuação. Frequência. Familiaridade.

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LIST OF ABBREVIATIONS

EFL - English as a Foreign Language
BP – Brazilian Portuguese
BPSE – Brazilian Portuguese Speaker(s) of English
COCA – Corpus of Contemporary American English
EJ – Early Japanese
EK – Early Korean
LJ – Late Japanese
LK – Late Korean
EP – European Portuguese
L1 – First Language/Mother Tongue
L2 – Second Language/Foreign Language
NNSE – Nonnative Speaker(s) of English
NSE – Native Speaker(s) of English
OPT – Oxford Proficiency test
RQ – Research question
SD – Standard deviation
SLA – Second Language Acquisition
SLM – Speech Learning Model
TL – Target language

SUMMARY

CHAPTER ONE
INTRODUCTION

> "[Art] thou an Ephraimite? If he said, Nay; Then said they unto him, Say now Shibboleth: and he said Sibboleth: for he could not frame to pronounce [it] right. Then they took him, and slew him at the passages of Jordan: and there fell at that time of the Ephraimites forty and two thousand"
> (Judges 12:5-7 - King James Version)

This remarkable epigraph reminds us that language, besides communication, can and, in fact, will be used to label people distinguishing those who speak a prestigious variety from those who speak not so prestigious ones, the educated from the non-educated, a southerner from a northeasterner, an upper class from a lower class member. Keeping this in mind we tackle two delicate issues regarding pronunciation when it comes to teaching English as a Foreign Language (EFL) to speakers of Brazilian Portuguese: English stress placement and vowel reduction. Stress placement is considered by many as their Achilles' heel because English and Brazilian Portuguese present distinct stress patterns. Regarding vowel reduction, it is relevant to highlight that although it is not essential that learners produce reduced vowels in order to be understood[1], it is believed to be the "secret" for those willing to attain the highest levels of fluency in English as pointed in Baptista (2001).

The author also states that it is possible to identify a Brazilian Portuguese speaker by her/his intonation, which seems to be influenced by various factors, such as distinct stress patterns between Brazilian Portuguese (BP) and English. An example to this distinction is the fact that BP is often labelled as being a syllable-timed language[2], whereas English is well-known as a stressed-timed language[3]. Furthermore, BP lacks a vowel called schwa /ə/ in its vowel system (at least at the

[1] Authors such as Jenkins (2002) would actually state that vowel reduction may hinder communication, since English learners may find it difficult to understand utterances containing reduced forms.

[2] This definition of BP being a syllable- timed language does not seem to be a consensus among scholars. For instance, Migliorini and Massini-Cagliari (2010) state that studies on the BP rhythm type do not show enough evidence to classify it either as stressed-timed or syllable-timed.

[3] Giegerich (1992) describes English, Russian and German as stressed-timed because these languages present isochronous intervals between their stressed syllables, that is, the intervals of stressed syllables are fairly equal in time.

phonological level) which is the most "common" vowel in English (Roach, 2000). Amongst these factors which make BP speakers have a typical/characteristic intonation, the present study will discuss how BP stress patterns and lack of vowel reduction influence Brazilians' production of English polysyllabic words. Intonation represents one of the factors which contribute to the Brazilian accent, which might reduce the effectiveness of communication in English when Brazilians interact with both native speakers of English (NSE) and other second language (L2) speakers.

As pointed out by Baptista (2002), remarkable changes took place in the studies of interlanguage phonology in the last decades. Indeed, technological development has provided us with tools to look at the acoustic characteristics of the speech sound signal with more informed, clearer and more accurate view than those previous studies that relied on auditory analysis or less sophisticated tools. Besides, these recent changes appear to be a consequence of both a renewed interest by language teachers and learners in the sound system of the target language (TL), and an increasing interest by second language acquisition (SLA) researchers in understanding the development of the TL perception and production (Derwing & Munro, 2005). Furthermore, some interest in the production of teaching materials has been shown by both educators and second language speech researchers (Zimmer, Silveira & Alves, 2009). In this respect, recent research carried out in the field will be presented and discussed in this study.

Under this perspective, Major (1986) states that at the initial stages of L2 acquisition, learners rely heavily on transfer from first language (L1) to the L2. Since this study takes into account the L1 and L2 systems, thus, it is necessary to take transfer into consideration, since it investigates the pronunciation of polysyllabic words which are cognates in English and Portuguese. The focus here is on stress placement on English polysyllabic words, which can be very complex for Brazilians as has been shown in studies such as Watkins (2001) and Brawerman-Albini (2007, 2012). An example of this difficulty to stress the right syllable is the cases in which the stress falls on a syllable which is the pre-tonic syllable in Portuguese as observed in the present study. For instance, the English word 'adoptable' /əˈdɒp.tə.bəl/ takes the stress on the antepenult syllable, while in the BP cognate 'adotável' /a.do'ta.vew/, the stressed falls on the penult syllable. The English tokens carry the type of neutral suffixes we are investigating, the antepenult syllable is the pre-tonic and the stress occurs on the penult

syllable. It is also worth noting that in Portuguese words such as in ‘adotável’, the stressed syllables bring a graphic mark (´). Thus, the production of English suffixes can also be challenging for a BSE, given that these English suffixes are unstressed and carry an unstressed vowel ‘adoptable’, whereas the suffixes in the Portuguese cognates examined in this particular study are either stressed as in ‘digital’ /dʒi.ʒiˈtaw/, or the addition of a suffix does not affect the stress patterns of the stem to which they are attached to as in ‘adotar’ /a.doˈtah/, which becomes ‘adotável’ / a.doˈta.vɛw/.

Taking into account the growing interest in the field of interlanguage phonology and understanding the importance that the adequate teaching and learning of pronunciation play in the life of teachers of English and their students, it is worthwhile to look at stress placement and the production of unstressed vowels in English produced by our Brazilian informants. The main goal of this study is to investigate how factors such as syllable structure, stress patterns, L1 interference, word frequency, word familiarity, and level of proficiency might affect stress placement and the production of the vowels in English neutral suffixes. For that, Brazilian speakers’ vowel quality and vowel duration were measured in order to find out whether these vowels’ F1, F2 and durational values either resembled or differed from the production of those of two American English speakers who participated in this study as to provide baseline data. In order to accomplish this goal, informants were asked to take one of the three production tests used to elicit the reading of a list of words in citation form. Thus, the English words included in the tests were carefully selected with the intention to fulfill three criteria for word selection: (a) being a cognate and having no stress on its suffix, (b) having, at least, three syllables to be considered a polysyllabic word, and (c) containing a neutral suffix (i.e., a suffix that does not carry or change stress to the root of the word to which it is attached).

All English polysyllabic words included in the test B were expected to end in an unstressed suffix containing an unstressed reduced vowel if uttered by a native speaker of standard British or American English, and the focus of this study is to analyze the production of BP learners of English by also looking at the productions of English native speakers in terms of target stress placement, duration of the unstressed vowel embedded in the suffix, and quality of the suffix vowel.

1.1 SIGNIFICANCE OF THE STUDY

A great deal of English-Brazilian Portuguese interphonology studies have reported data from Brazilian learners in the south and southeast of Brazil (Watkins, 2001; Brawerman-Albini, 2007, 2012; and Garcia, 2012) and studies concerning regional/linguistic groups of BP learners from other Brazilian regions are likewise relevant. Studies such as Barbosa's (2012) looked at the production of the BP unstressed vowel [ɐ] produced by females of four different Brazilian states, including the states of Maranhão and Pará, in the northeast and north of the country, respectively. Having in mind the importance of more interphonology studies in which informants identified themselves as speakers of the BP variety spoken in the northeast region of Bahia, the present study might shed some light by providing researchers with findings on the production of unstressed vowel and stress assignment by learners from Bahia, from two L2 proficiency levels. It is expected that the collected data and the achieved final results could be highly relevant, especially for future second language speech researchers and teachers of English who have an interest in the issues of vowel production and stress placement. This study provided data to draw comparisons and contrasts and to find congruent or divergent patterns which affect stress assignment within the word and its vowel quality and duration values. Also, this study might provide educators with a better and informed basis regarding learners' real difficulties and inadequate L1 transfer, particularly in terms of stress placement and vowel reduction of English polysyllabic words.

Taking the importance of word stress to this study, Cruz (2005) investigated how intelligible the word "comfortable" would be, if the stress fell on the syllable "ta". The results showed that out of 14 English native speakers, 8 did not understand the word. Likewise, Walker (2010) and Jenkins (2000) agreed that word stress is an important feature for native speakers, however it does not seem to be when it comes to interaction among non-native speakers.

An additional contribution of the present study is to shed some light on the discussion regarding the status of the unstressed vowels in Brazilian Portuguese. Authors such as Câmara Jr (1970, p. 43) describe the BP vowel inventory as not having a central vowel that resembles the English schwa, while authors such as Cristófaro-Silva (2010, p. 86) advocate that the BP /a/, when it appears in unstressed word-final

position, is realized by most BP speakers as a schwa (e.g. *gota* /ˊgota/]), and it should be transcribed as [ə][4]. In order to discuss this issue, the present study will collect BP data to measure the acoustic features of the BP vowels in both stressed and unstressed position. The same procedure will be followed to measure the English central vowels /ʌ/ and /ə/ produced by native speakers of English, to have a better understanding of how the two vowels differ acoustically and how they compare to the English suffix vowels produced by Brazilians.

In order to have a broader understanding of the research, in the following subsection, the general objectives and research questions will be presented in a more detailed manner.

1.2 GENERAL OBJECTIVES AND RESEARCH QUESTIONS

As it was aforementioned, this study had as its general objective of this study is to investigate how factors such as syllable structure, stress patterns, L1 interference, word frequency, word familiarity, and level of proficiency might affect stress placement and the production of the vowels in English neutral suffixes. In order to achieve this aim, we looked at whether assigning stress to the polysyllabic words would be influenced or not by speakers' proficiency levels. For that, L1 syllable structure, BP stress patterns, and English and Portuguese vowel inventories were taken in consideration. Another objective was to look at duration of the stressed and unstressed vowels, their quality in terms of F1 and F2 and also, investigate the patterns of duration and vowel quality in two English vowels: the stressed /ʌ/ and the unstressed /ə/. Moreover, BP words containing the grapheme 'a' (e.g. cata) in stressed and unstressed positions were collected in order to gather information of vowel quality and duration. Besides, we also aimed at looking at word frequency in this study, because it could help us confirm or not the hypothesis that more frequent words should be less difficult for L2 speakers to produce them. Finally, we aimed at looking at how word frequency and familiarity influence the production of these English unstressed suffixes present in the polysyllabic words. Thus, in order to carry out this study, three research questions were devised:

[4] Cristófaro-Silva (2010) affirms that some BP speakers, depending on their dialectical region, might realize the unstressed word-final /a/ as [ɐ].

RQ1: How do Brazilian informants stress the English polysyllabic cognate words whose neutral suffixes are not meant to carry stress?

RQ2: How do Brazilian informants produce the English mid-central vowels embedded in suffixes attached to the English polysyllabic cognate words?

RQ3: How do word frequency and word familiarity of the L2 tokens affect the assignment of stress and production of the vowels in English neutral suffixes?

1.3 ORGANIZATION OF THE STUDY

Besides the Introduction (Chapter 1), the present study is organized as follow. Chapter 2 covers the most relevant and significant theoretical and methodological studies in the area of interlanguage phonology in Brazil and abroad. These studies dealt with stress placement, production of English vowels in stressed and unstressed positions within a word and syllable structure fostering or hindering the production of certain English vowels, such as the schwa. Chapter 3 brings detailed information of the method applied for the data design and collection, the auditory and acoustic analyses of the recorded data, and general information about the American and Brazilian speakers of English that took part of this study. Chapter 4 brings the results and findings of the current work taking into account the literature presented in Chapter 2 and the method which is summarized in Chapter 3.

The 3 research questions are revisited and discussed along with its results. It is worth mentioning that Chapter 4 is organized according to each guiding research question and consecutive results. At last, Chapter 5 focuses on the main findings of the thesis, as well as its limitations and suggestions to future research.

CHAPTER TWO
REVIEW OF LITERATURE

As aforementioned, due to the high importance of this Chapter to the body of this text, theoretical and methodological studies, mainly within the field of interlanguage phonology, phonetics and acoustic phonetics are provided. Also, empirical studies are described and discussed in order to inform our findings.

2.1 ENGLISH UNSTRESSED VOWELS

Watkins (2001) argues that native English speakers are hardly aware of vowel reduction. However, as stated in Flege and Bohn's (1989) instrumental study on vowel reduction and stress placement, one of the main aspects of pronunciation that is easily noticed as a foreigner accent is a non-native rhythm which results from a lack of reduction of unstressed vowels. The abilities to unstress certain syllables and reduce their vowels appear to be dependent on one another. Their study also shows that Spanish speakers seem to acquire stress patterns before vowel reduction. Thus, native-like rhythm may also depend on native-like intonational and stress patterns, as highlighted by Flege (1984) and Flege and Bohn (1989).

Besides this discussion on native-like intonation and its relation to how the reduced vowel affects the perception and production of the English rhythm, Roach (2000) points out that stressed syllables are more perceptually prominent compared to unstressed syllables in terms of four different features: (i) loudness, (ii) length (duration), (iii) pitch, and (iv) vowel quality (F1 and F2). It is relevant to add that the author calls attention to the fact that some of the four features might be more relevant than others to perceive/produce such unstressed vowels. As a result, these features might play a role when it comes to English vowel reduction. For instance, vowels tend to be shorter, present lower intensity and different quality in weak syllables, whereas in strong ones they are perceived as relatively longer, having higher intensity and bearing full vowel quality as: (/æ/-/u/- /e/ and /i/). As an example of which cues can be used to measure stress placement in English compound words by Brazilian learners of English, Silveiro and Watkins' (2006, p. 203) study used two cues to confirm which syllables in their

compound words were stressed, namely, "the acoustic measurements of amplitude (of the higher peaks) and duration of the two constituents of each sequence". These acoustic cues are in accordance with Roach's description for the identification of prominent syllables. The present study measures the stressed syllable in relation to the surrounding syllables by looking at syllable duration and vowel quality (F1 and F2 values).

Giegerich (1992) states that reduced vowels will occur only in unstressed syllables, and that in monosyllabic grammatical words (e.g. articles and prepositions) the reduction seems to be much less predictable than in polysyllabic words. In this respect, Watkins (2001) investigated the use of weak forms of function words (e.g., words such as *at, for, of* and *to*) in the English of advanced Brazilian speakers. This study concluded that the variability in the production of the reduced vowel was highly influenced by syllable weight[5] (heavy or light syllables), the stress level of proceeding syllables (primary or secondary stress syllables), and the type of following segments (vowels or consonants).

2.2 SYLLABLE STRUCTURE AND STRESS PLACEMENT IN ENGLISH AND PORTUGUESE

As syllable is a central issue in this study, let us take a look at how Roach (2000) defines it phonetically: "syllables are usually described as consisting of a centre which has little or no obstruction to airflow and which sounds comparatively loud; before and after this centre" (p.70). The author mentions four types of common English syllables. The simplest type of syllable consists of just one vowel, which is called 'minimum syllable' as in the words 'eye' [aɪ][6], 'or' [ɔ:] and 'are' [ɑ:]. Some syllables may have more than just silence preceding its centre, as in those syllables in which there is an 'onset' as in the following examples, 'far'[fɑ:] and 'more'

[5] Duanmu, Kim and Stiennon (2005) argue that syllable weight plays a role in stress assignment. For instance, a syllable is heavy when its rhyme is VX (VV or VC) as in '*loo'* /lu:/ and in '*cat'* /kæt/, and it is a light syllable when its rhyme is V (a short vowel) as in '*to*' /tə/ or a C (syllabic C) as in '*apple*' /æp.l̩/.

[6] All transcriptions are based on the pronunciation of standard British English.

[mɔ:]. There is a third type of syllable which does not have an onset, but instead it has a 'coda' as in 'an' [**æ**n], 'ought' [**ɔ**:t] and 'it' [**ɪ**t]. Finally, there are syllables which have both onset and coda as in 'write' /raɪt/, 'fort' /fɔ:t/ and 'cart' /kɑ:t/. As an illustration, let us take a look at the syllable structure of the word 'thought', which is a simple word that can be represented in the following syllable tree (Figure 1) as having in its onset [θ], its rhyme being made of a nucleus (peak) [ɔ] and its coda [t] as in [θɔt]:

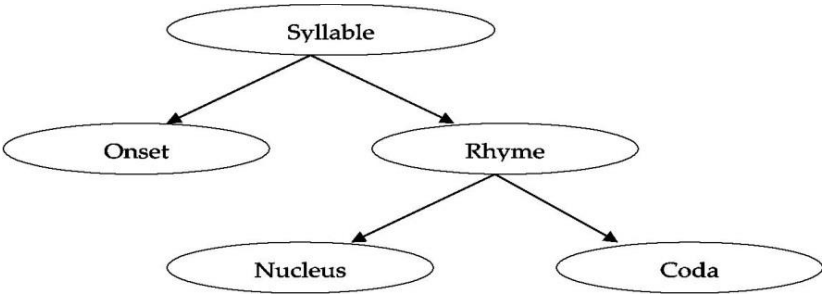

Figure 1. Syllable structure as presented in Roach (2000).

It is relevant to mention that a strong syllable differs from a weak one because the former has "a rhyme which *either* has a syllable peak which is a long vowel or diphthong, *or* a vowel followed by a coda (that is, one or more consonants)" (Roach, 2000, p. 98). Thus, examples of strong syllables are 'sea' [si] and 'bet' [bɛt]. In contrast, a weak syllable has in its peak a short vowel such as [ɪ] or [ə] and it would just be followed by a coda if the peak is a short vowel (e.g., the last syllables in 'open' [əʊ.pən] and 'bit' [bɪt]).

It is important to mention that in Brazilian Portuguese (BP) the syllable structure can be made of a V as in '*e'* ('and') [e], CV as in '*fé'* ('faith') [fɛ], VC as in '*ar'* ('air') [ar], CVC as in '*paz'* ('peace') [pɑs], CCVC as in '*prós'* ('pros') [prɔs], and CCVCC as in 'trans' ('trans') [trăz]. Furthermore, in BP, the stress in a considerable number of words falls on the second syllable from the end of the word (penultimate). However, one must remember that stress placement in Portuguese can be fairly complex. For instance, noun and verb systems have particularities as stated in Matheus and d'Andrade (2002), who

discusses the European Portuguese system, but whose observations also apply to BP. As the authors explain, the verbs are like the nouns in the sense that they may be phonetically stressed in any of the last three syllables, as an example, for the present indicative '*fala'* ('you speak') [ˊfa.lɐ] and for imperative *'fale'* ('speak') /ˊfa.li/. It can be noticed that the phonological stress normally falls on the penult syllable and, according to the authors, verb stress is commonly attracted by heavy syllables ending in final consonants and final diphthongs (e.g., *falei* 'I spoke' [faˈleɪ], '*falar'* (to speak) [faˈlah]. In BP, diacritical signs (ˊ, ^) are used to indicate the stressed syllables of certain words.

Camara Jr. (1986) highlighted that the unstressed vowel sounds are frequently described in relation to the stressed vowels because the latter can have their distinctive traits easily observed and categorized. In this direction, the author divided the BP vowels in three categories, namely: 1. pre-stressed vowels; 2. post-stressed vowels (non-final position); and, 3. unstressed vowels in final position (in open or closed syllables). For a better understanding of what Câmara Jr. meant by the three categories of unstressed vowels in different positions within the word, the categories are reproduced as follows (Câmara Jr., 1986, p.44):

Pre-tonic vowels:

high	/i/		/u/
mid		/e/ /o/[7]	
low		/a/	

examples: high: /i/ *pilar* ('pillar') /pi.ˈlar/ and /u/ *guru* ('guru') /gu.ˈru/

mid: /e/*Pelé* (name) /pe.ˈlɛ/ and /o/ *picolé* (ice lolly) /pi.ko.ˈlɛ/

low: /a/*materno* ('motherly') /ma.ˈtɛr.nu/

Post-tonic vowels (non-final position)

high	/i/		/u/
mid		/e/ /.../[8]	

[7] Note that for some BP varieties, these two mid vowels /e/ and /o/ can be also realized as /ɛ/ and /ɔ/, respectively.

[8] The author describes BP spoken in the city of Rio de Janeiro. Other dialectical regions would have an [o] in this position as in '*época'* ('epoch') [ɛpoka] instead of [ɛp.ka] or [ɛpuka].

low /ɑ/

examples: high: /i/ *tônico* (‘stressed’) /ˈ**to.**ni.ku/ and /u/ *fórmula* (‘formula’) /ˈ**for.**mu.la/

mid: /e/ *número* (‘number’) /ˈ**nu.**me.ru/

low: /a/*abóbada* (‘dome’) /ɑ.ˈbɔ.bɑ.dɑ/

Unstressed vowels in final position

high /i/ /u/

low /ɑ/

examples: high: /i/ *corte* (‘a cut’) /**kɔh**tʃi/ and /u/ *fato* (‘fact’) /ˈ**fa.**tu/

low: /a/*saga* (saga) /**sa**ga/

Similarly to Câmara Jr.’s description for the unstressed vowels in different positions, Mateus and d’Andrade (2002) pointed out that the most remarkable distinction between EP and BP lies in the unstressed vowel system. This distinction is due to the fact that the BP vowels tend to bear their full vowel characteristics in both stressed and unstressed positions and the authors stated that “vowel quality is significantly more independent from word-stress in BP than in EP” (p.17). This means that the vowels in EP have a considerable amount of vowel reduction in the realizations of their unstressed forms.

For the present study, it is worthwhile to point out that the vowels which occur in (1) in BP are characterised as full vowels: [i], [o], [u], [a], [e]. For the post-stressed position, the BP vowel system presents a type of reduction for the mid, back vowel “o”, which is commonly pronounced as a high, round [u] in various regions of Brazil. When it comes to unstressed vowels in final position as in (2) BP’s pronunciation for “e”, “o” and “a” are reduced to [ɪ], [ʊ] and [ɐ]. This brief description of the BP vowel system[9] is relevant when it comes to vowel reduction in English by Brazilian learners. If the literature is right in proposing that there is a lack of reduced vowels in the BP system, this fact might account for the difficulties Brazilians are likely to face to produce English reduced vowels, in particular the schwa.

[9] The EP vowel system will not be thoroughly addressed in the present study, since no EP data will be investigated nor it is the objective to compare BP and EP in respect to stress placement or their vowels on stressed and unstressed syllables.

2.3 SOME INTERPHONOLOGY STUDIES ON VOWEL REDUCTION AND STRESS PLACEMENT

It has been present in the literature that learners rely considerably on their native language (NL) to learn additional languages, a process known as language transfer (Gass & Selinker, 1994, p. 53). Transfer of L1 sounds to L2 pronunciation represents one of the most important factors in L2 phonology (Major, 1994; Flege, 1995; Baptista, 2002; Lee et al. 2006; Watkins & Rauber, 2010; Brawerman-Albini, 2007, 2012).

For a better understanding of the concept of transfer and for believing production is closely related to and influenced by transfer, a brief description of the Speech Learning Model (SLM) is necessary in an attempt to explain possible difficulties in the acquisition of L2 sounds[10]. This model was developed by Flege (1995) and it is considered by many as a cornerstone of the SLA field, mainly because of its wide scope. Among its four postulates and seven hypotheses, the model proposes that L2 learners maintain for their lifetime the abilities and capacities that were present whilst their L1 speech learning was taking place. Postulates 1 and 3 support what it is understood by transfer in this study as follows:

"**P1**: The mechanism and processes used in learning the L1 system, including category formation, remain intact over life span, and can be applied to L2 learning.

P3: Phonetic categories established in childhood for L1 sounds evolve over the life span to reflect the properties of all L1 and L2 phones identified as a realization of each category" (p. 239).

Postulates 1 and 3 are applied in various studies, and we can take Lee et al. (2006) as an example. For these authors, most previous L2 studies on the acquisition of English stress have investigated the stress placement patterns on the basis of syllable structure, the lexical classes of noun and verb, or both. In this section, we will focus on studies on stress placement and the production of unstressed reduced vowels. Special attention will be given to the study conducted by Lee et al. (2006) because the present study aims at looking at two phonological features presented in their research, namely: duration (ms) and vowel

[10] pite of the fact that the SLM is mainly concerned with perception of L2 sounds, evidence that perception influences the production of the L2 has been investigated a number of L1s.

quality (F1 and F2 in hertz)[11], as well as observing stress placement in the target syllables. In this context, the authors state that the prosodic features of a first language (L1) might affect L2 learners' ability to produce English reduced vowels with accuracy. Moreover, the L2 learners' prosodic system might affect the production of English reduced vowels as well as phonetic features lacking in the L1 rhythmic system seem to be harder to be acquired. In their study on the production of unstressed English vowels by early and late Korean and Japanese bilinguals, who had been living in the USA for many years, the authors investigated vowel reduction in terms of duration (ms), vowel quality (F1 and F2 in hertz), intensity and Fundamental Frequency (F0)[12].

It is noteworthy that besides investigating the possible differences between early and late learners, Lee et al. (2006) were also interested in investigating whether the differences were related to the L1 phonological systems of their informants. As to the Korean and Japanese informants, all were highly proficient in English and their level of proficiency was measured by standardized tests. It was important for their study to include only speakers who used English on a daily basis and who had long length of residence in the United States, besides having attended college or university in this same country.

Taking into consideration that Korean, Japanese and English have noticeably different prosodic systems, Lee et al. (2006) aimed at investigating the potentially different effects of L1 on the acquisition of four phonetic features used to indicate English unstressed vowels. Their first aim was to compare stressed and unstressed vowels (the latter being realized as schwa-like centralized vowels by English native speakers) produced by early and late Korean/Japanese-English bilinguals. Their second aim was to look at the effect of age of acquisition on the production of unstressed English vowels by early and late bilinguals from each language background. They intended to examine whether the phonological status of phonetic features in the L1 would differentially affect the production of the English unstressed vowel as a function of age of acquisition. It is important to note that the early and late Korean and Japanese informants, both bilingual groups, presented in their

[11] For Yavas (2011), F1 is related to tongue height and F2 values show how front or back a vowel is because of the position of the tongue in the mouth. For instance the back vowel /u/ has lower F1 and higher F2 values, compared to the vowel /a/.

[12] Together with duration, Roach (2000) describes intensity as related closely to the perception of loudness of a given speech acoustic signal and Fundamental Frequency is closely related to pitch. Note that Fundamental Frequency mainly refers to the physical attributes of a sound, whereas the Pitch to its physiological properties.

production test an English native-like lower fundamental frequency for unstressed as opposed to stressed vowels.

Lee et al. (2006) hypothesized, under the light of the feature hypothesis[13], that (a) Korean speakers were expected to be accurate in their production of F0 for unstressed vowels as compared to stressed vowels, but less accurate for other features, whereas (b) Japanese speakers were expected to be accurate in their production of both F0 and duration of unstressed vowels as compared to stressed vowels, but less accurate for the other features.

The phonological status of four phonetic features in Korean and Japanese is summarized in Table 1, taking into account the phonetic features used to realize English unstressed vowels.

Table 1

Phonological status of the phonetic features used to realize the English unstressed vowels in Korean and Japanese (Lee et al., 2006, p. 494).

PHONETIC FEATURE	KOREAN	JAPANESE
F0	Yes	Yes
Duration	No	Yes
Intensity	No	No
Vowel quality reduction	No	No

In the same study, the groups were divided as follows: ten native speakers of English as the control group (five females and five males – their mean age was 24.9 years old) and for the non-native speakers, ten early Korean English bilinguals (seven females and three males), ten late Korean English bilinguals (seven females and three males), ten early Japanese English bilinguals (six females and four males) and ten late Japanese English bilinguals (six females and four males). All informants were subjected to a pure-tone hearing screening in both ears in order to exclude any possibility of hearing impairment.

[13] The feature hypothesis affirms that it is more difficult for L2 learners to acquire L2 phonetic features (duration (ms), F1 and F2 (in hertz), intensity and F0) which are not used to indicate phonological contrasts in an L1. Moreover, McAllister et al. (2002, as cited in Lee et al., 2006) along with Flege (1995) state that low production accuracy is a reflection of the difficulty L2 learners have in perceiving phonetic features that are not phonologically meaningful in their L1.

The test used in Lee et al.'s (2006) study contained 19 English words orthographically represented in English, in which the unstressed vowels were marked in bold and the stressed vowel received an acute accent (´), (e.g.: **a**gén**da** and básk**e**t). Confidence of informants' knowledge in terms of meaning of the words and their ability to pronounce the words were measured in 5-point scales, therefore only words with a rating of 5 on both scales were taken for the analysis. Native speakers had to listen to the recordings produced by the bilinguals and were asked to mark the placement of the main stress in the words. In order to guarantee a constant prosodic environment for the production of the target unstressed vowels, the production task had the participants record the 19 English words only once in a carrier phrase, for instance, "*I said _____ this time*".

For the measurement and analysis, the authors looked at their data focusing on fundamental frequency (in hertz), intensity (decibels), duration (in milliseconds), and F1 and F2 (in hertz). Table 2 summarizes Lee et al.'s main findings. The authors report the log ratios of the given variables which come from ± one standard error of each feature for duration, F0, and intensity. For vowel quality, the authors report the average of perceptual distance taking into consideration the orthography of the target vowels in stressed/unstressed position.

Table 2

Summary of the findings for the four phonetic features used to realize the English unstressed vowel in native English, early and late Korean and Japanese bilinguals (Lee et al., 2006).

Groups	Duration (mean ratio of the duration of unstressed to stressed vowels)	Fundamental frequency of unstressed to stressed vowels	Intensity for the unstressed to stressed Vowels (dB)	Vowel quality (Average perceptual distance[14] between unstressed vowels with different orthographic representations)
N	.45	91	5.1	70.2

[14] Lee et al. (2006) converted the F1 and F2 values using a mel scale. According to Ladefoged (1996), mel scale is used as an accurate way to represent pitch. It can be defined as "the unit pitch such that when pairs of sounds are separated by an equal number of mels, they are also separated by equal intervals of pitch" (p. 80).

SE					
	E	.48	90	4.1	111.4
J					
	L	.47	89	4.8	170.9
J					
	E	.54	93	2.4	59.0
K					
	L	.57	90	3.2	117.7
K					

Regarding the feature duration, the unstressed vowels produced by the English native speakers presented roughly half the duration of stressed vowels (ratio = .45). The early and late Japanese bilinguals presented a more English native-like mean than the early and late Korean bilinguals. The results for duration show that the feature hypothesis is confirmed since Japanese uses duration differences in its system, whereas Korean does not use duration to indicate phonological differences. Thus, it is possible to say that Japanese speakers were more successful than Korean speakers when producing the durational difference between English stressed and unstressed vowels. On the other hand, age of acquisition is not a relevant factor which affects production between English stressed and unstressed vowels.

As for the issue of fundamental frequency, all the groups under investigation produced the unstressed vowels with clearly lower fundamental frequency than stressed vowels, ratios ranging from .89 to .93, with peak being produced in a native-like fashion by all groups of bilinguals. These results also support the feature hypothesis due to the fact that both Korean and Japanese bilinguals use F0 in their L1 pitch accent to indicate prosodically relevant information.

The results show that the Japanese and Korean groups displayed distinct values for intensity as compared to the intensity produced by the native group in unstressed vowels, but only the Korean groups' values were significantly different. Intensity to signal phonological information is not a characteristic belonging to Korean and Japanese languages, so the bilinguals were expected to be inaccurate in producing intensity differences between stressed and unstressed vowels in English. However, contrary to what was predicted, the Japanese groups were more native-like than the Korean groups regarding intensity, thus the feature hypothesis is not supported in terms of intensity.

According to Lee et al. (2006), for vowel quality (F1 and F2), spelling did not seem to have played a role in the productions of the

NSE and early Japanese speakers of English. The production of the reduced English vowels by the EJ speakers was similar to those of the NSE, whereas the early Korean group produced a reduced vowel that was acoustically similar to the Korean reduced vowel [ɨ]. When it came to the two late groups of Japanese and Korean, they seemed to be highly influenced by orthography in their production and their unstressed vowels had full vowel qualities.

Having brought a review on the most important issues raised by Lee et al. (2006), the view will be turned now to Watkins and Rauber's (2010) and Brawerman-Albini's (2007, 2012) studies on reduced vowels and stress placement respectively. Watkings and Rauber's (2010) study is noteworthy for the present piece of research mainly because they deal with the production of vowels by advanced Brazilian English speakers and Andressa's (2007) study for dealing with stress placement.

To have a better understanding of Watkins and Rauber's (2010) study in which they investigated the variability in the production of pre-tonic vowel reduction by highly proficient Brazilian speakers of English, it is important to describe its participants. The procedure for data collection and the hypotheses which were proposed by the researchers will be summarized below.

The 30 participants were all English teachers with a high level of proficiency in English. Regarding their Brazilian region, 20 are from the south of Brazil and 10 from the north of Brazil. There were two groups of male and female: 24 females and six males. There was also a control group made of five females and five males. Being five native speakers of American English and the other five from other countries in which English is spoken as their native language (Australia, Wales, South Africa and England). Out of the ten NSE, there were also five EFL teachers who were living in Brazil at the time of the study (one Australian, one American, one South African, one Welsh and one English).

For the data collection, the authors designed a test in which participants were supposed to read a list of 18 sentences and also six distractors randomly. The target orthographic vowels were "a", "o" and "u". The occurrences of tokens containing "a" and "o" in unstressed and stressed open and closed syllables were twice for each vowel. For the "u" vowel, all its unstressed and stressed syllables were open. In terms of controlling the preceding environment, 50% of the selected were preceded by a stressed syllable and 50% by unstressed ones.

Watkins and Rauber's (2010) main findings are as follows. Both the degree of durational reduction and vowel quality are influenced by (a) orthographic letter, (b) preceding stress level, and (c) presence or absence of a coda. The authors further hypothesized that all of these factors vary significantly between groups (native-speakers vs. Brazilian Portuguese (BP) (Watkins & Rauber, 2010, p. 85)).

Taking the study's hypotheses into account, the researchers found out that the results for vowel reduction obtained by male and female informants between the two groups were not significantly different as expected. Table 3 summarizes the results for the duration variable for both native speakers o English (NS) and Brazilians (BP).

Table 3

Duration mean and standard deviation of the participants' production of stressed and unstressed vowels in open and closed syllables (Watkins & Rauber, 2010, p. 89)

Stress levels		**Unstressed**			**Stressed**		
Vowels		**A**	**O**	**U**	**A**	**O**	**U**
No coda	BP	42 (11)	42 (11)	28 (8)	93 (24)	88 (18)	75 (16)
No coda NS		37 (7)	35 (10)	25 (7)	90 (24)	102 (36)	68 (6)
With coda	BP	50 (12)	55 (15)	39 (11)	124 (22)	118 (24)	--
With coda NS		46 (13)	47 (10)	32 (8)	130 (28)	112 (29)	--

Regarding "u" tokens, all groups produced them significantly shorter than the other vowel tokens. As for stressed and unstressed syllables with coda, the results also confirmed that the "u" tokens were shorter than "a" and "o". Nonetheless, BP speakers produced a significantly longer unstressed "o" as compared to native speakers. Concerning vowel quality, the values between female and male BP native speakers were not significantly different. As for the stressed vowels, Brazilian native speakers produced only the orthographically *o-a* and *u-a* contrasts with a superior Euclidean distance as compared to the female native speakers of English. In sum, Watkins and Rauber (2010) concluded that the results for duration and vowel quality values produced by the BP informants and native speakers of English approximated.

An important study that focuses on stress placement in suffixed words is the experiment conducted by Brawerman-Albini (2007). In her

experiment, she aimed at identifying whether stress patterns of Portuguese plays an important role in stress placement in English words. More specifically, the study focuses on the analysis of inadequate stress placement on suffixed English words produced by 20 advanced Brazilian students of English who had never been to an English speaking country. As their level of proficiency was a relevant factor to be considered in the study, informants were chosen among employees of a company which required an annual English exam in order to test their knowledge of English. Those who performed better on the test were selected to participate in the research.

A list of suffixed words was used to collect data, and it encompassed three different English stress patterns, namely: words with stressed syllable on the fourth syllable from the end (e.g.: **ar.**chi.tec.ture, **me.**mo.ra.ble, **for.**tu.na.tely), words with stress on the second syllable from the end (e.g.: e.du.**ca.**tion, ve.ge.**ta.**rian) and words with stress on the third syllable from the end (e.g.: e.**ter.**ni.ty, phe.**no**.me.nal). The choice for these suffixed words was mainly because of the presence of different stress patterns from their Brazilian cognate counterparts. Table 4 summarizes Brawerman-Albini's (2007) findings.

Table 4

Number of tokens and percentages of inaccurate stress placement for words placed in a sentence and in isolation.

	The word in the sentence		**The word in isolation**	
Stress Pattern	Stress on fourth syllable from the end	Stress on second/third syllable from the end	Stress on fourth syllable from the end	Stress on second/third syllable from the end
Number of tokens[a]	1,000	1,000	1,000	1,000
% of incorrect responses	72.8%	11.7%	76%	11.5%

Notes. [a] Number of tokens = 20 informants times 50 sentences

The results show that the words taking stress on the fourth syllable from the last are extremely difficult for both contexts. At the

sentence level, the informants assigned wrong stress in 72.8% of the words, while words in isolation were inaccurately stressed 76% of the time. As for the words receiving stress on the second or third syllable from the last, the informants performed much better, obtaining about 11% rates of inaccurate stress placement. The study's results suggest that the great deal of inaccurate stress placement produced by the informants appeared to be due to fact that they transferred some rules and the impossibility of stressing the fourth from the last syllable was the most difficult one.

This chapter brought the most relevant studies concerning stress placement and vowel production in English and Portuguese interphonology field with the intention to show how they have contributed to the present study. Most of the studies were about the production of English vowels and stress placement in both English and Portuguese. Also, the concept of transfer was approached by highlighting two SLM's postulates: Postulate 1 and Postulate 3 in order to bring one of the most important theoretical frameworks adopted in many of the studies on interphonology. Thus, results of some empirical research was reported due to the fact that they effectively influenced further research in the area, as they have contributed for some methodological decisions of the present study. In the following chapter, the method of the present study will be explained in detail.

CHAPTER THREE
METHOD

The present study aims at investigating how factors such as syllable structure, stress patterns, L1 interference, word frequency, word familiarity, and level of proficiency might affect stress placement and the production of the vowels in English neutral suffixes. Moreover, the present study addresses how these Brazilian informants produce the English unstressed mid-central vowel /ə/. Taking this into account, Brazilian speakers' vowel quality and vowel duration were measured in order to find out whether these vowels' F1, F2 and durational values either resembled or differed from the production of those of two American English speakers who participated in this study as to provide baseline data. Three production tests were administered to our groups of informants, two of which were given to both Brazilian and American speakers, and the third which was only used with the Brazilian speakers. The tests are briefly outlined below.

The first instrument, production test A, was designed to verify how those two groups produced the English mid-central and mid-back unrounded vowels in unstressed and stressed positions. The production of the unstressed /ə/ was expected to have lower F1 values and higher F2 values and to be shorter in terms of duration when compared to the stressed English mid back unrounded vowel /ʌ/ (Hillenbrand et al., 1995). In order to verify these predictions, both Brazilian and American speakers of English were asked to read 12 sentences which contained the mid-central vowel /ə/ in the unstressed final syllables of nine words such as "Afric**a**" and "samb**a**" and the stressed mid back unrounded vowel /ʌ/ in stressed syllables of nine words such as "c**u**t" and "l**o**ve" (see Section 3.2 and Appendix A for detailed information of production test A).

As regards the second instrument, production test B, the American and Brazilian speakers of English were required to read a list of 16 polysyllabic words holding, in their neutral/unstressed suffixes, a vowel similar to those of the English unstressed vowel /ə/ produced in the production test A. It is relevant to highlight that the main purpose of the production test B was to investigate stress placement, neutral/unstressed suffix vowel quality and vowel duration (see Section 3.2 and Appendix B for detailed information of production test B).

A third production test was designed to measure the Portuguese stressed vowel /a/ and the final unstressed Portuguese /ɐ/ in words such as "c**a**t**a**" and "p**a**t**a**" (see Section 3.2 and Appendix C for detailed information of test C). For this test, only the Brazilian speakers of English were asked to read the sentence list, due to the fact that we intended to observe whether the Brazilian Portuguese vowels' values of F1 and F2 and vowel duration affected the Brazilian speakers' production of English vowel quality and duration in the English production tests A and B.

Besides other linguistic variables such as syllable position, vowel quality and duration, we also attempted to investigate how the Brazilian informants' level of proficiency in English could affect their vowel productions and stress placement (Garcia, 2012). Thus, a proficiency test (*Online Oxford Placement Test*) was administered to the Brazilian speakers of English in order to look at a possible correlation between their proficiency level results and their performance on accurately stressing and producing the target vowel in the polysyllabic production test B. By using a six-point Likert scale in which informants needed to indicate how familiar they were with the target words and by investigating corpora frequency of the same tested words (Gonçalves, 2014), we also intended to observe whether these two variables (i.e., word familiarity and word frequency) affected the way these words were produced.

The following sections bring detailed information regarding the participants and all research instruments, the tests design, and procedures for data collection and data acoustic analysis. Finally, the research questions will be revisited and the procedures to conduct the statistical analyses will be presented.

4.1 INFORMANTS

A group of 20 female Brazilian speakers of English were invited to join this study as informants and they all read and signed a consent form[15]. Since they were all originally from the state of Bahia and were studying at the English Undergraduate Program, the decision to collect

[15] The informants were given a consent form as well. It is in accordance with *Resolução 466/12* and it was reviewed and approved by UFSC research Ethics committee under the register CAAE: 47185215.1.0000.0121.

the data in Bahia was twofold: (a) this was a convenient sample, as they attended the university where I currently work, and (b) research investigating the production of vowels and stress placement of English learners from the northeast region are welcome. At the time of data collection, an expressive number of female[16] English students were willing to take part in the study. However, only 20 participants reached intermediate level scores in the Online Oxford Proficiency Test, which was one of the criteria for informant recruitment. Besides providing L2 data (see Appendices A and B), these Brazilian speakers provided the values for F1 and F2 and duration of the stressed and unstressed BP vowels [a] and [ɐ] (see Appendix C). For the proficiency test to be done, a total of 44 informants were given the login and password to access the test from home. Out of this number of informants, 10 of them opted for taking the online proficiency test at the university claiming that they had a better internet connection at the campus (see Section 3.4 for detailed information of the test and its levels).

With respect to the proficiency test, out of 44 online proficiency test passwords were distributed, but six volunteers never started or completed it. Of those who completed it, 23 informants were placed at the intermediate level and only 20 of them showed up for the data collection. These informants had their production tests recorded individually at the language lab at the university. The Brazilian informants' ages ranged from 18 to 38 (*M*: 22.9 years). Regarding the length of years they had been studying English, the years reported by them ranged from less than a year (six months) to 14 years (*M*:6.1 years). They had been students at the undergraduate English program from six months to four years (*M:* 1.94 years).

For the English baseline informants, two female Americans, both 19 years old, one from Kingsport, Tennessee and the other from Detroit, Michigan volunteered to participate. They reported having some knowledge of Spanish, but almost no Portuguese. At the time of the data collection, they had been in Brazil for three months as part of their university exchange program.

[16] Male informants promptly volunteered to participate as well, but as our objective was to investigate only the female informants' productions, the decision not toinclude male informants was due to the fact that male and female present distinct values of their vowel formants (Yavas, 2011), which makes acoustic analysis more complex, as you need to separate acoustic data per sex. Besides that, the number of male BPSE was less than half a dozen before the proficiency test. After the proficiency test, it was likely that male informants would not represent a sufficient number of participants to form two different English proficiency levels in order to run statistics.

Concerning information about knowledge on foreign languages, one Brazilian informant 14 reported to be fluent in German, due to her 5-year experience living in Germany and Austria. She had also reported that during the time she had lived in Germany, she had taken a two-year course at a university in which advanced German was required. Regarding the exposure to English in an English-speaking country, one informant acknowledged having lived abroad for a period of three years, in Ireland. Appendix E provides the questionnaire applied for the BP speakers of English.

Having pointed out the most relevant information about the participants who recorded the production tests, we will now explain how the corpus containing the target vowels was built (Sections 3.2, and 3.3).

4.2 INSTRUMENTS

All the three production tests were designed in order to guarantee a sufficient number of occurrences of the English mid-central vowels in different contexts in terms of syllable structure and word position in which these vowels occurred. In this section, we will describe how the three production tests are structured and their respective aims.

Production test A was composed by 12 sentences. Each sentence contained one to three target words, making a total of 18 target words. These words were either words with the English mid-central vowels /ə/ as in "**a**gree" and "yog**a**" or the stressed vowel /ʌ/ in words such as "c**u**t" and "ab**o**ve" (see Appendix A for the complete list of the words present in the 12 sentences). With this production test, our main intention was to check whether the participants produced these two English vowels distinctly from one another. For the stressed vowel, all tested words displayed onset and coda. Concerning their orthography, they were either spelt with an "o" (six words) or "u" (three words). For the unstressed mid-central vowel /ə/, we did not attempt to control the position and their spelling form, once they were all spelt with "a" and there were seven occurrences of the vowel occupying the final syllable with no coda as in "Afric**a**", and in two tokens, the unstressed vowel was in the first syllable as in "**a**part". Despite the fact that the words carrying the unstressed vowel were not controlled, we managed to observe whether their production varied within speakers of Portuguese and English and how their production differed from the production of

the stressed mid-central vowel. In order to do that, we analyzed their duration and vowel quality in terms of F1 and F2. The main intention for analyzing these two vowels in Test A was to have some data from the unstressed mid-central vowel to compare with the unstressed vowels present in production test B.

Since our objective is also to look at how informants assigned lexical stress and how they produced the English mid-central vowels embedded in two types of neutral suffixes present in polysyllabic words[17], production test B was carefully developed and in the following paragraphs will describe its main features and objectives.

As it can be seen in Table 5, the English words included in this test had either three or four syllables as in "tropical" and "adaptable", respectively. Also, they carried these two suffixes: "***-<u>a</u>ble***" for words with four syllables or "***-<u>a</u>l***" for words with three syllables. We followed Roach (2000) in order to choose these suffixes, which were referred to as neutral suffixes, given the fact that they did not affect the stress of the words to which they are added. For instance, the word "bel**ie**ve" and "bel**ie**vable" both stressed on the second syllable from the left. For the words to which the suffix "*-al*" was added as in "s**<u>u</u>**ffix" and "s**<u>u</u>**ffixal", the stressed syllables fall on the first syllable from the left.

Table 5

Groups of English words ending with unstressed suffixes, accompanied by phonemic transcriptions and stress patterns

<u>Group A</u>: Polysyllabic English words <u>ending in –**able**</u>	**<u>Group B</u>**: Polysyllabic English words <u>ending in-**al**</u>
respectable	tropical
/rɪsˈ**pɛk.**tə.bəl/	/ˈ**trɔ**.pɪ.kəl /
o O o o	O o o
Detectable	suffixal

[17] A pilot study was carried out in 2013 aiming at looking at stress placement and vowel reduction in the production of the English suffixes "-ment" and "ance". Both unstressed suffixes had the nasal palatal /n/ as its following context. This made the acoustic analysis using PRAAT exceeding difficult. That was because it was not clear when the vowel ended and the nasal consonant started. Regarding its informants, they were two female and one male advanced BPSE. Results were not reliable because the researcher mixed the male and female set of data in the analysis.

/dɪ.ˈ**tɛk**.tə.bəl/	/ˈ**sʌ**.fɪk.səl/
o O o o	O o o
contestable	radical
/kən.ˈ**tɛs**.tə.bəl/	/ˈ**ræ**.dɪ.kəl/
o O o o	O o o
collectable	medical
/kəˈ**lɛk**.tə.bəl/	/ ˈ**mɛ**.dɪ.kəl/
o O o o	O o o
adoptable	lexical
/əˈ**dɒp**.tə.bəl/	/ˈ**lɛk**.sɪ.kəl/
o O o o	O o o
adjustable	digital
/əˈ**dʒʌs**.tə.bəl/	/ˈ**dɪ**.dʒɪ.təl/
o O o o	O o o
adaptable	criminal
/əˈ**dæp**.tə.bəl/	/ˈ**krɪ**.mɪ.nəl/
o O o o	O o o
acceptable	affixal
/əkˈ**sɛp**.tə.bəl/	/ˈ**æ**.fɪk.səl/
o O o o	O o o

In the searching and selection of the 16 polysyllabic words for production test B, Oxford Colour Dictionary (1998) was used. These 16 words were divided in two groups, one composed by suffixes ending in "-**a**ble" and the other group of words ending with "-**a**l" suffixes. Due to the difficulty in selecting words which fit the criteria the study demanded, a search on http://www.scrabblefinder.com was necessary in order to find additional words ending in the aforementioned suffixes. After having these words selected, they had their pronunciation double-checked to guarantee their suffixes did not affect stress placement, and for that the Cambridge Dictionary Online (http://dictionary.cambridge.org/) was used. It is worth emphasizing that these chosen suffixes do not change the vowel quality or carry the stress when added to form a new word. These polysyllabic English complex words were formed by two distinct manners, one by adding a suffix to a verb stem (group A type) and another one by adding a suffix to a noun (group B type). The tested words are shown in Table 5 above, and they

are accompanied by a broad phonemic transcription[18] and their stress patterns are here represented by the following symbols: **o** = unstressed syllable; **O** = stressed syllable. In this study, as none of the tokens carried secondary stress, this level of stress was not analyzed.

Regarding the number of syllables and stress patterns in the English words, the words ending in *-able* are all four-syllable words and the stress falls on the third syllable from right to left (proparoxytone). The words ending with *-al* contain three syllables and the stress also falls on the third syllable from the end (proparoxytone). In this study, the initial vowel of the suffixes, technically containing a mid-central vowel in English spoken by all informants, were analyzed.

For Roach (2005), there is no vowel /ə/ in the suffixes –able and –al, and the /l/ is syllabic, as in *apple* /æp.l̩/ and *little* /lɪt.l̩/. However, Giegerich (1995) states that there is a schwa sound preceding the /l/ and that this vowel should appear in the transcriptions if the syllables preceding the suffixes are not stressed, which is the case of the tested words in the first and second columns of Table 5. Thus, as the words ending in –able and –al used in this test do not occupy an immediate post-tonic position, the /l/ is not syllabic and the schwa sound will appear in the transcriptions.

Choosing cognates of Portuguese words, as shown in Table 5 above, was necessary because we wanted to investigate to what extend the stress patterns that the Brazilian informants used in these words resembled those of the dictionarized target forms or resembled the similar word form present in Brazilian Portuguese, thus showing strong influence from their L1. Also, it was an attempt to examine whether L1 transfer could explain the vowel quality of the vowels in the English suffixes. It is noteworthy to observe that, for the Portuguese cognates, the stress for the words ending with the "-vel" (e.g. adaptável), falls on the second syllable from the end (paroxytone), whereas for the suffix, "-al" (e.g.tropical), its stress falls on the last syllable (oxytone).

Another relevant piece of information regarding the BP suffixes used in the cognates is whether these three suffixes are neutral, as it is the case in English. Curiously, suffixes in Portuguese are commonly described by authors such as Cristófaro-Silva (2006) to have a tendency to attract or interfere in the word stress (e.g., 'real' (real) [heˈaw],

[18] We have chosen to bring the phonetics transcriptions to this table for illustrative purposes, because they do not represent the actual production of our informants.

'realmente' (really) [heaw′měti])[19]. However, one of the suffixes chosen in this study, "*-vel*", does not have this feature of attracting or changing stress. For example, "*-vel*" is added to verbs ending in "*-ar*" in the infinitive forms, thus forming adjectives (e.g., *coletar* 'collect' (verb, infinitive [kɔ.le.**tar**]) becomes *coletável* 'collectable' (adjective, [kɔ.lɛ.**ta**.vɛw]). As for *–al, the suffix is added to nouns ending in –o to form adjectives (e.g., léxico "*lexicon" (adjective, *lexical* in English lexical [lɛ.ksi.**kaw**])), and its suffix carries the stress. It is noteworthy to highlight that some BP speakers could produce an audible epenthetic vowel in between the consonant cluster /ks/, thus affecting syllable structure for the English word 'lexical' [leksi′kaw].

The third production test was designed to look at how the informants produced the BP vowels [a] in stressed position and [ɐ] in unstressed position presented in a set of eight two-syllable words inserted in four Portuguese carrier sentences as in "Em páta e cápa temos 'a'". Note that for all target words, an acute symbol (´) was placed on the stressed syllable to help the Brazilian informants identify the stressed syllable. Having in mind the intention to measure duration and vowel quality of these two BP vowels, we followed Yavas (2011), who observes that vowel production is greatly affected by the phonological context in which these vowels occur. In order to control the immediate contexts, voiceless stop consonants (/p/,/t/ and /k/) were used before the tested vowels. For this test, the syllable stress patterns of the tested words had strong and weak (SW) distribution (See appendix C for detailed information of Test C).

Also, the spelling for the unstressed vowel was controlled for during test designing, so that they were orthographically written with an "a" due to the fact that in the polysyllabic words in the production test B, the vowels spelling presented in the two types of suffixes was also "a" as in the suffixes **-a**ble and –**a**l in the words "tropic**a**l" and "respect**a**ble", for instance. Concerning production test C, our main intentions were to figure out whether the Brazilian informants distinguish between the stressed low /ɑ/and unstressed /ɐ/.

[19] Note that the phonetic transcriptions of the vowels present in these Portuguese words were in accordance to the BP Portuguese variety of the informants. In other BP varieties, the pre-tonic vowels may vary [koletar]

4.3 PARTICIPANTS

Even though the participants were regularly attending the English undergraduate program in their respective semesters, an online placement test developed by Oxford University Press (http://www.oxfordenglishtesting.com) was given in order to have a more reliable measure of their English proficiency levels and to select the intermediate level students to participate in this study. As it was previously mentioned, the online proficiency test was given to a pool of 44 prospective informants in order to select the intermediate level students. Even though the informants could take the test from home, 10 of them preferred taking the test at the university campus. For finishing the placement test, informants were allowed the maximum time of 80 minutes.

The test aimed at measuring and placing these L2 English learners in accordance with three different skills/abilities, namely reading, use of English and listening communicative competences. The structure of the test consists of 45 questions in which the first 30 questions test reading and use of English, whereas the last 15 questions test the participants' listening skills. It is important to point out that the proficiency test did not test speaking skills, so that, we believed that a different scenario would have emerged if speaking skills were also tested for those 44 informants.

Regarding the scores and placement levels, the *Online Oxford Placement Test* (OOPT) follows the Common European Framework, which means that the informants were placed after taking the test into the following levels presented in Figure 2, which summarizes the results for the 20 informants recruited to provide speech data for this study.

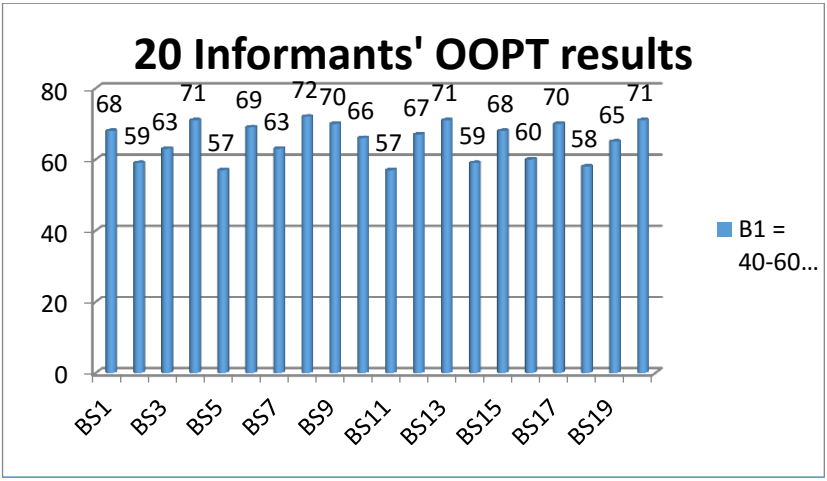

Figure 2: Brazilian informants' scores and levels at the OOPT

According to the OOPT system, the level scores range from a continuous numerical scale, as follows: A1 = 1-20, A2 = 20-40, B1 = 40-60, B2 = 60-80, C1 = 80-100 and C2>100. This study recruited those informants who scored at grade B1 and B2 bands, which are described as "independent users' (intermediate/upper intermediate levels).

4.4 PROCEDURES FOR THE DATA COLLECTION

Each Brazilian informant was first given printed sheets containing the English production tests to read aloud (see Appendices A, B, and C). The BP informants received instructions on how to hold the microphone and the adequate distance to keep the microphone away from their mouths. The researcher decided on record each participant individually in order to avoid background noise during the recordings. They also received instructions in English about their reading speech rate before starting the digital recordings of the words for then being instructed to record the English words. In order to minimize the effects of language interference, they were given a short interval from one production test to another. The American informants recorded the English production tests (A and B) only, and were given similar instructions for the recording procedures.

Regarding the recording procedures, Reetz and Jongman (2009, p. 116) argued that frequency is often used to describe signals and offers us "a basis for understanding many characteristics of sound waves" such as vowel quality and identification of different levels of stress. In this study, the sets of words and sentences were recorded at a sampling frequency rate of 22050 Hz by using the sound recorder tool Praat (version 5.3.57), and a dynamic, multilateral SM81LC Shure microphone. The computer used for recording and storing the digital files was a *Dell Inspiron* Ultrabook.

All the recordings were collected in the sound-proof cabin of the language lab at the university in Jacobina (Bahia) to make sure the recordings were not affected by outside noise. In case the recording was interrupted by any noise or informants' needed to cough or sneeze, they were told to keep reading from the previous word or sentence. The words in the English stress placement production test (Appendix B) were read twice by each informant, and the researcher supervised the recordings to guarantee that all words were recorded by all informants.

4.5 THE WORD FAMILIARITY TEST AND WORD FREQUENCY

After reading aloud and digitally recording the English production test B, the Brazilian Portuguese speakers of English (BPSE) were asked to answer a six-point Likert-scale test in order to assess their level of familiarity with the English words used in the stress placement production test B. According to Dörnyei (2011, p. 104), "these scales refer to a cluster of several differently worded items that focus on the same target". By using this scale, the intention was to prevent any item of the test to interfere excessively in the overall result of the test, so that inconsistent response to one item would not represent a serious problem to the whole result.

By adapting the Likert scale from Gonçalves (2014), informants were asked to classify each group of polysyllables from 0 to 5, being 0 = I don't know this word and 5 = I know this word and it is very familiar to me. The following is an example of a word familiarity test item in which informants were asked to classify their knowledge of the words they had previously recorded (See Appendix D for details about the word familiarity test).

	0	1	2	3	4	5
suffixal						

Besides testing for word familiarity, we decided on examining word frequency in order to investigate whether the word stress placement in production test B depicted any correlation between word familiarity and word frequency. It was expected that more frequent and more familiar words resulted in more accurate stress placement. Regarding the frequency measurements for the English words, frequency of occurrence was obtained from the COCA (Corpus of Contemporary American English) website (http://corpus.byu.edu/coca/). The polysyllabic English words were ranked according to the number of occurrence in the corpus. Each of the 16 words has their frequency presented in Table 14 (Chapter 4).

4.6 DATA ANALYSIS FOR TESTS A, B AND C

The three tests were analyzed taking into account three aspects: (1) the lexical stress of the English words falls on the expected syllable within a word. In order to do this, a mapping of both stressed and unstressed vowels produced by the BP and English informants was conducted in test B. For this analysis, we relied on auditory analysis to determine where stressed fell, as well as on acoustic features such as duration, amplitude, pitch and intensity of the formants; (2) the F1 and F2 values for the unstressed vowels produced by the Brazilian and English informants presented in the neutral suffixes in test B, and in unstressed syllables of test A were analyzed. Also, both the BP stressed and unstressed vowels of test C were analyzed to investigate possible correlations with the F1 and F2 values of the English production tests. In order to have a more reliable measurement, the F1 and F2 of the vowels and the duration of the target unstressed syllable was analyzed; and, (3) word frequency or familiarity rates provided by the BP participants for each tested word, and whether these rates were correlated with the participants' performance on the production tests. Moreover, the data sets were examined in order to find out whether other factors such as L1 stress pattern, participants' proficiency level, number of syllables of the English words (4 vs. 3) affected the results in the production test B.

According to Yavas (2011), spectrographic analyses of speech are ideal when it is necessary to have more precise descriptions of acoustic speech signals and, as a result of it, the researcher can have a more reliable and clearer view of acoustic signal cues which are not easy for auditory analysis to capture in details. Figure 3 shows a generated acoustic signal of the word "detectable" produced by an American female who participated as baseline in this study. This informant's productions were analyzed in terms of relative duration and F1 and F2 values to be later compared with the Brazilian learners.

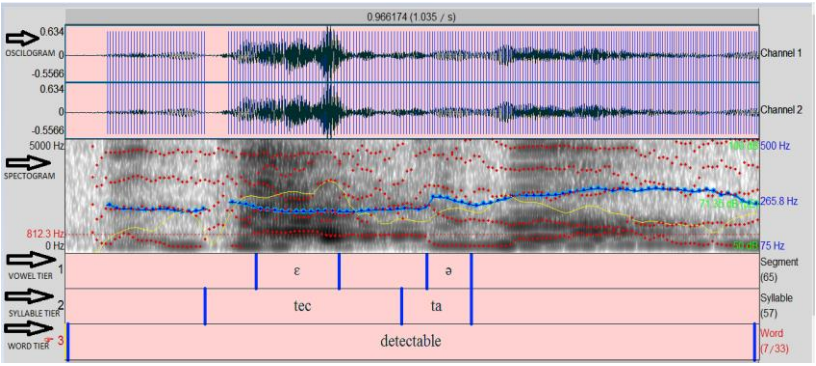

Figure 3. The labelling of the polysyllabic word "detectable" produced by a female native English speaker of American English.

The first part of Figure 3 shows an acoustic representation of the recorded signal on Praat (version 5.3.57). The first acoustic image is an oscillogram which is used to measure the acoustic signals in terms of amplitude. That was done by looking at its vertical axis (vocalic pulses). Vowel duration was measured by looking at its horizontal axis in milliseconds (ms). The second image displays the spectrographic image of the same word. Yavas (2011) also states that there are three acoustic properties of speech sounds which are relevant to be measured, namely frequency, time, and amplitude. Frequency can be seen as "the individual pulsation produced by the vocal cord vibrations for a unit of time" (Yavas, 2011, p. 101). This vibration depends on physiological features of the vocal folds such as its length, thickness and how tense it is during the production of a particular sound. That explains the reason why children, adult males and females have different formant values for their vowels, for instance.

For the acoustic property of speech sounds defined as time, Yavas (2011) defines it as reflecting "the duration of a given sound" (p. 101).

Finally, according to Yavas (2011), amplitude is related to the amount of force used in the realization of a speech sound due to different subglottal air pressure.

For labelling the acoustic speech signal, the software Praat (version 5.3.57) was used. First, the long sound file stored in the computer saved in .wav format was opened. After that, this file was annotated in order to generate the tiers for the labelling. Tier number 1 represents the target vowels. Due to space constraints, acronyms were used or short forms for labelling the segments in order to identify speakers, the analyzed words and vowels. For instance, "AS1J_ɛ"ə stood for American Speaker 1, reading word "J" (detectable) which carried the full vowel /ɛ/ in its stressed syllable and "AS1j_ə" was the same speaker and word, but producing the vowel /ə/ present in the unstressed syllable. Tier number 2 corresponds to the stressed and unstressed syllables which were segmented in order to get their duration, so that relative duration could be measured. The last tier, number 3 was added to measure word length and can be used to measure speech rate. Thus, the first tier represented the segments, the second one represented the target syllables and the third one represented the target words.

It is noteworthy that to determine how the L2 informants produced the target vowels presented in the suffixes of the English polysyllabic words, duration and F1 and F2 values were the cues adopted in this study. Both F1 and F2 values are obtained from the vowel temporal midpoint, where the periodic vocalic pulses are steadier when compared to the first (vowel onset) and third point (vowel ending) temporal points. By measuring the vowel midpoints, we reduce the influence of adjacent sounds (coarticulation) and of transitions.

4.7 PLOTTING ANALYSIS OF THE ENGLISH VOWELS /ə/ AND /ʌ/ AND THE BRAZILIAN PORTUGUESE LOW AND MID-CENTRAL VOWELS

In order to have the informants' vowels in the production tests plotted, all the rough acoustic vowel data were carefully selected. This selection consisted of establishing the cutoffs values for the F1 and F2, following a suggestion provided by Gonçalves (2014). For instance, only F1 values which ranged from under 400 to over 1000 were used.

For the F2 values, the cutoff ranged from under 1000 to over 2000. These cutoffs were obtained by inspecting the literature on the area (Hillenbrand et al., 1995, Rauber, 2006), which suggested no mid-central and low vowels lower than 400, or higher than 1000. Thus, only F1 and F2 values that resembled a vowel were used for the plotting. Other values were excluded from the data spreadsheets. Since our data were non-normalized, we followed Gonçalves' (2014) procedures for building vowel graphs. They were conducted through the script "Plotar vogais", written by Bion (2006). For plotting for dispersion (vowel loci), "Plot from table", also written by Bion (2006), was used in order to look at possible vowel overlaps by informants in the three production tests.

4.8 RESEARCH QUESTIONS AND STATISTICAL ANALYSIS

As aforementioned, this study aims at looking at how a group of Brazilian intermediate English level students would place the stress on polysyllabic words whose suffixes are not supposed to carry the stress and also how these informants produce the English mid-central vowels in these unstressed suffixes of polysyllabic words.

Thus, in order to carry out this study, three research questions were devised:

RQ1: How do Brazilian informants stress the English polysyllabic cognate words whose neutral suffixes are not meant to carry stress?

RQ2: How do Brazilian informants produce the English mid-central vowels embedded in suffixes attached to the English polysyllabic cognate words?

RQ3: How do word frequency and word familiarity for the L2 tokens affect the assignment of stress and production of the vowels in English neutral suffixes?

Regarding the statistical analyses for the tests administered in this study, the program SPSS (Version 16) was used and alpha was set at .05 (Larson-Hall, 2010). Before deciding on the statistical tests to be used, all variables were examined by using descriptive statistics. The results showed the data was not normally distributed, and for this reason, the statistical tests used are non-parametric (Spearman correlation and Wilcoxon test). Since all informants were female, normalized plots were not needed in order to check whether the acoustic variables differed in terms of vowel frequency and duration.

CHAPTER FOUR
RESULTS AND DISCUSSION

The main aim of this present chapter is to report the results of the current work by taking into account the literature summarized in Chapter 2. Hence, the three research questions are revisited and discussed along with their results. The chapter is organized according to the guiding research questions and their consecutive results.

5.1 RESEARCH QUESTION ONE: SPEAKER´S PROFICIENCY LEVEL AND STRESS PLACEMENT RESULTS

The first research question inquired how Brazilian learners from two different proficiency levels, intermediate and upper-intermediate, assigned the stress to the English cognate polysyllabic words (ex. *respei**tá**vel*, res**pec**table). In order to answer this RQ, we mapped the number of correct answers in stress placement in relation to the participants' proficiency levels. More details are provided below.

To observe whether stress placement was appropriate, an auditory analysis was carried out. The researcher used auditory analysis to inspect each token, followed by a visual analysis done on Praat. This visual analysis consisted of the inspection of the pitch line (the blue line), and the inspection of intensity (yellow line) in relation to the vowel quality. This was because intensity is higher whenever a segment is stressed, which is indicated by the pitch line. The researcher observed that whenever the pitch line was misplaced in the production of the word, the vowel had a different quality. For instance, in the word 'respectable', some speakers pronounced the 'a' either as /eɪ/ or /ɑ/, resulting in [rɪs.pɛkˈ**teɪ**.bəʊ] and [rɪs.pɛkˈ**tɑ**.bəʊ], respectively.

Participants' level of proficiency and accurate stress assignment to the unstressed suffixed syllables can be seen in table 6 below.

Table 5

Participants' proficiency level along with participants' number of accurate answers in the placement exam and with stress placement.

Participant	Level of proficiency	Number of correct answers in the OOPT	% of correct answers in stress placement
BS1	Upper	68	100
BS2	Inter	59	75
BS3	Upper	63	68,75
BS4	Upper	71	81,25
BS5	Inter	57	75
BS6	Upper	69	68,75
BS7	Upper	63	81,25
BS8	Upper	72	87.5
BS9	Upper	70	93,75
BS10	Upper	66	81,25
BS11	Inter	57	75
BS12	Upper	67	87,5
BS13	Upper	71	87,5
BS14	Inter	59	62,5
BS15	Upper	68	100
BS16	Upper	60	75
BS17	Upper	70	62,5
BS18	Inter	58	87,5
BS19	Upper	65	68,75
BS20	Upper	71	100
	MEANS	**65,2**	**80,5**

From the 20 participants, only three obtained 100% of correct responses in the stress placement test, with the lowest percentages around 62% and 68% (mean = 80,5%). Given the small data sample that this study consists of (14 upper-intermediate and six intermediate

informants), a non-parametric correlation was run to observe whether the number of correct answers in the placement exam could predict participants' performance with stress placement of polysyllabic words in reading. Spearman revealed a weak (*rho* = .40), non-significant correlation (*p.* = .085).

This does not corroborate what Garcia (2013) posits when he argues that less proficient learners have more problems when placing stress in English. Our study shows that even more advanced learners (e.g. BS3 and BS17) still might face difficulties. By considering that this type of neutral suffix (-able, -al) does not convey stress placement in English, contrary to BP in which this type of suffix carries lexical stress (Bisol, 2010), we speculate that the L1 still posed a great deal of influence for this speech component, so that stress could be assigned to the suffixes instead. A higher level of proficiency did not help learners surpass their inexperience in attending to suprasegmental cues when acquiring this aspect of the L2 speech. It appears that suprasegmental components of an L2 are not as robust as segmental components for the human ear, thus requiring more efforts from the L2 learner and implicating on the need for the L2 syllabus to include explicit instruction on this type of lexical knowledge. For Brawerman-Albini (2012), perception activities may also help learners with stressing words more accurately.

5.2 RESEARCH QUESTION TWO: PRODUCTION OF THE ENGLISH VOWELS OF THE SUFFIXES ATTACHED TO THE TESTED POLYSYLLABIC WORDS

In order to answer the second RQ regarding how our informants produced the vowels embedded in the unstressed English suffixes, the results of the three production tests described in Chapter 3 are to be reported in terms of vowel quality (F1 and F2 values) and vowel duration in the following pages. We examined the mean and dispersion for the plotted vowels in the three tests. Also, duration results gathered from the three tests (A, B and C) will be reported and discussed as the tables displaying F1 and F2 and duration means and statistical significance will be presented.

5.2.1 The production of stressed and unstressed English vowels by the Brazilian informants

Before looking at the results of the production of the unstressed vowels presented in the suffixes, the results of the production test A will be described in order to check how different the English vowel in stressed position /ʌ/ and the unstressed vowel /ə/ are. We looked at these results in terms of vowel quality and duration values.

Table 7 shows the descriptive statistics for the production of these two English vowels /ʌ/-/ə/ when produced by Brazilian speakers of English. For the F1 in stressed vowel, the mean was 652, which was very close to the F1 in the unstressed vowel, whose mean was 686. Similar results for the F2 means for both vowels were found. The F2 means for the stressed vowel was 1389 and the mean for the unstressed vowel was 1559.

It is important to note that there was huge variation between the minimum and maximum values for F1 and F2 for both vowels. A possible explanation for these results is that these learners might have not yet acquired stable categories for the investigated vowels by the time data collection took place. These learning difficulties are likely to arise due to the different acoustic environment of such vowels, as well as differences in syllable idiosyncrasies (open and close), and the different orthographic symbols used to represent these vowels (ex., *l**o**ve*, *b**u**t*).

Concerning vowel relative duration for the stressed vowel, the mean was 35, whereas for the unstressed one, its relative duration was 22. It was confirmed that unstressed vowels are relatively shorter than their stressed counterparts (Ladefoged, 2010; Watkins, 2001; Watkins, Brawerman-Albini & Bertochi, 2010). Table 7 brings the values of F1-F2 and duration values for the English vowels [ʌ] and [ə].

Table 7

Descriptive statistics for the production of the English stressed vowel [ʌ] and the English unstressed vowel [ə] by the Brazilian informants

	Mean	SD	Min-Max
F1 [ʌ]	652	108	452-923
F2 [ʌ]	1389	265	773. -1952

Duration* of [ʌ]	35	10	9-62
F1 [ə]	686	134	451-950
F2 [ə]	1559	234	789 -2130
Duration* of [ə]	22	7	8-47

* Values of the target vowel relative relation

Figure 4 portrays the mean of F1 and F2 values of English unstressed central vowel /ə/ and English stressed mid-back unrounded vowel /ʌ/ produced by 20 Brazilian informants.

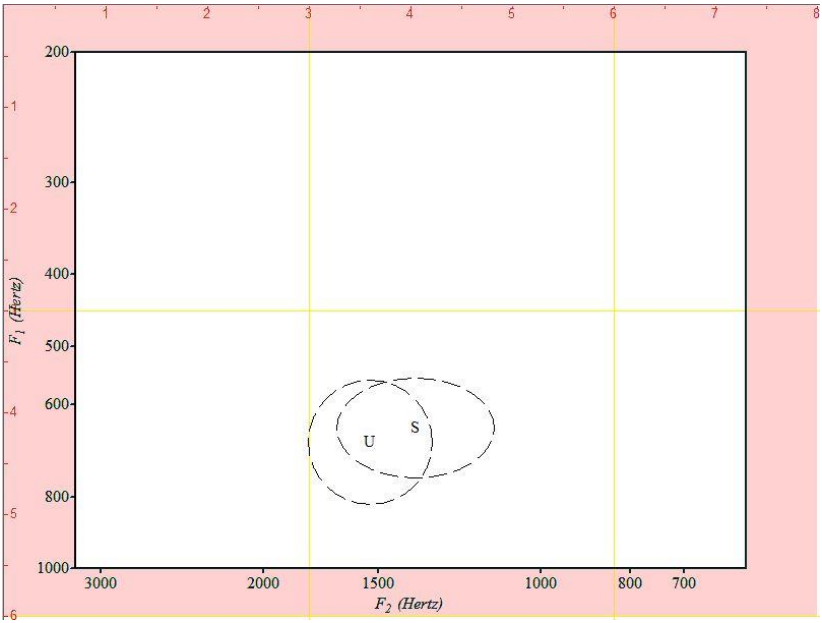

Figure 4. The mean of the unstressed central vowel /ə/ and stressed mid-back unrounded vowel /ʌ/ produced in 16 English tokens by 20 Brazilian informants. The unstressed and stressed vowels are represented by (U) and (S) respectively.

As it can be seen in Figure 4, the unstressed vowel is slightly lower and more central than the stressed vowel. These vowels produced by the two Americans (Table 8) indicate that the English unstressed vowel /ə/ is lower and more central, compared to the stressed vowel /ʌ/,

while the stressed vowel is produced higher with the tongue more retracted when produced by native speakers of English.

Table 6

Descriptive statistics for the production of the English stressed vowel [ʌ] and the English unstressed vowel [ə] by the American English speakers

	Mean	Min-Max
F1 [ʌ]	765	640-991
F2 [ʌ]	1537	1264 -1708
Duration* of [ʌ]	35	15-54
F1 [ə]	600	483-687
F2 [ə]	1624	1180-1859
Duration* of [ə]	21	7-44

* Values of the target vowel relative relation

For a better view of how these vowels were distributed, Figure 5 is displayed. Note that a couple of stressed vowels were produced further back. This may be due to the fact that some of the tokens were spelled with the letter "u" (e.g. 'but'), and during the test, we infer that the informant might have been influenced by the orthographic code.

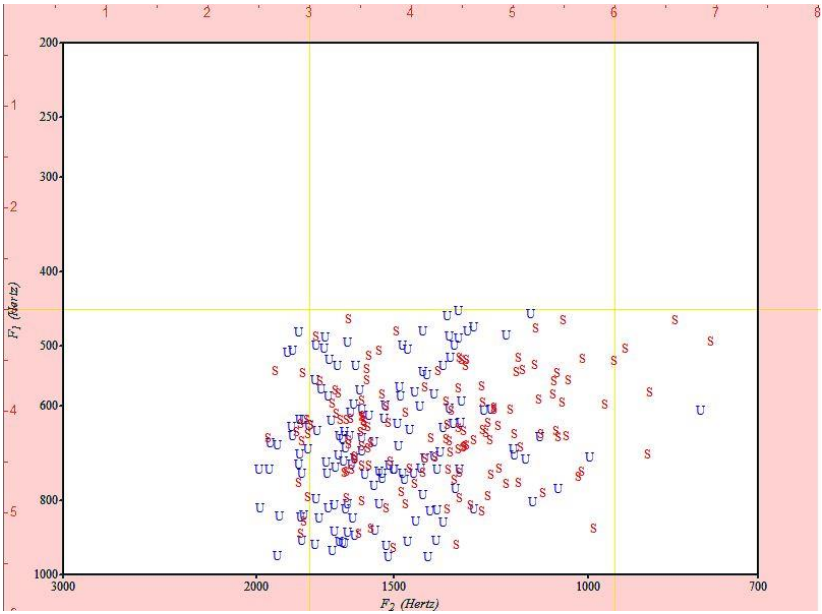

Figure 5. The dispersion of the unstressed central vowel /ə/ and stressed mid-back unrounded vowel /ʌ/ produced in 16 English tokens by 20 Brazilian informants. The unstressed and stressed vowels are represented by (U) and (S) respectively.

To close up this subsection, the Wilcoxon test was used to compare the means for F1 and F2, and duration of the two vowels. The results showed that the stressed and unstressed vowels do differ significantly in terms of vowel quality and duration ($p<0.05$). That demonstrates that their vowel quality and duration were produced as distinct vowels, despite their dispersion and their mean values for F1 and F2 being pretty close as shown in Table 7. Table 9 displays the details of the statistical analysis.

Table 7

Results of a Wilcoxon test run to check the differences between F1-F2 and duration values of the two English vowels: /ʌ/-/ə/

	F1Unstressed - F1Stressed	F2Unstressed - F2Stressed	Duration Unstressed - Duration

			Stressed
Z	-2,119	-4,788	-8,912
Asymp. Sig. (2-tailed)	,034	,000	,000

5.2.2 Vowel quality and duration values in the production of the English suffixes attached to the tested polysyllabic words

Our intention when designing the experiments of this thesis was to map the production of the English unstressed vowel, orthographically spelled with an "a" by the two different proficient groups of English learners at the State University of Bahia. So far, we have seen that the English stressed and unstressed central vowels differed in terms of vowel quality and duration in the production test A. We have also obtained the means F1 and F2 values and relative duration of the target unstressed vowel. These values will be necessary to understand how the English unstressed vowel is produced in polysyllabic words containing two neutral suffixes.

Table 9 brings the descriptive statistics for the production of the English vowel /ə/ in the target suffixes "–al" and "–able". We can see that the means of F1 and F2 values in the English vowel in "al" were 636 and 1377 Hz respectively. For the F1 means, the suffix "-able" was 589 Hz and F2 was 1587 Hz. For relative duration, the suffix "-al" was 13ms and the suffix "-able" was 8ms. With a first glance, it is possible to say there is a difference However, when the minimum and maximum values for F1 and F2 and duration are seen, the gap between the lower and the higher values corroborate to previous studies, which found that the unstressed English vowel can demonstrate greater differences in terms of F1 and F2 values because its nature of centrality and for the fact that it is in constant contrast to a stressed full-vowel counterpart. Moreover, the difference can be noticed in the duration due to aspects like environment and syllable structure (Yavas, 2011).

We also gathered the same data produced by native speakers of English in order to compare the productions of the unstressed and stressed suffix vowels by the two groups. For the native speakers, the means of F1 was 644 and F2 was 1781 for the suffix "-al". Then, when we looked at the means of F1 and F2 for the suffix "-able", the native speakers produced F1 values of 635 and F2 values of 1692. We

observed that duration was 17ms for the suffix "-al" and that a shorter relative duration was displayed for the suffix "-able", 10ms. It can be seen in Table 10 below.

Table 8

Descriptive statistics for the production of the English [ə] in the unstressed "-al" and "–able" by the American informants

	Mean	SD	Min-Max
F1 -al	644	151	456-833
F2 -al	1781	134	1663-2013
Duration* of –al	17	6	9-25
F1 –able	635	154	443-827
F2 –able	1692	144	1512-1871
Duration* of –able	10	2	7-13

* Values of the target vowel relative relation

Thus, we can infer by looking at these values compared to the F1 and F2 and duration values of the unstressed vowel of the test A that for both the Brazilian and American informants (Tables 9 and 10), there was some variation in their production of the unstressed vowel in suffixed and non-suffixed words. Focusing on the results for the BP informants, we can say that the unstressed vowel in non-suffixed words (e.g. "samb**a**") were produced with higher F1- F2 and duration values than the unstressed suffixed vowels.

Table 9

Descriptive statistics for the production of the English unstressed vowel /ə/ in "–al" and "–able" by the Brazilian informants

	Mean	SD	Min-Max
F1-al	636	128	460-899
F2-al	1377	173	1109-1804
Duration* of –al	13	3	6-22
F1 –able	589	104	450-861
F2 –able	1587	183	1109-1987
Duration* of –able	8	3	3-28

* Values of the target vowel relative relation

In Table 11, the duration values for the unstressed suffix vowels for both groups of informants can be seen. We can say that the vowels in suffix “-able” were much shorter than those of suffix “-al”. Besides that, both vowels were shorter than those produced by the American speaker. One possible inference for this difference was that tendency the BP informants produced their unstressed vowels shorter to sound more native-like. That tendency could be explained in terms of feature analysis. For instance, it seems that a possible explanation for this duration issue is related to the BP informants’ L1, whose language rely on duration values to perceive and produce stressed or unstressed syllables distinctively. They are likely to have this duration feature transferred to unstressed syllables of other L2s, which duration functions as in their L1. Thus, despite being able to perceive this duration cue for unstressed and stressed syllables, they seem to be overemphasizing this cue.

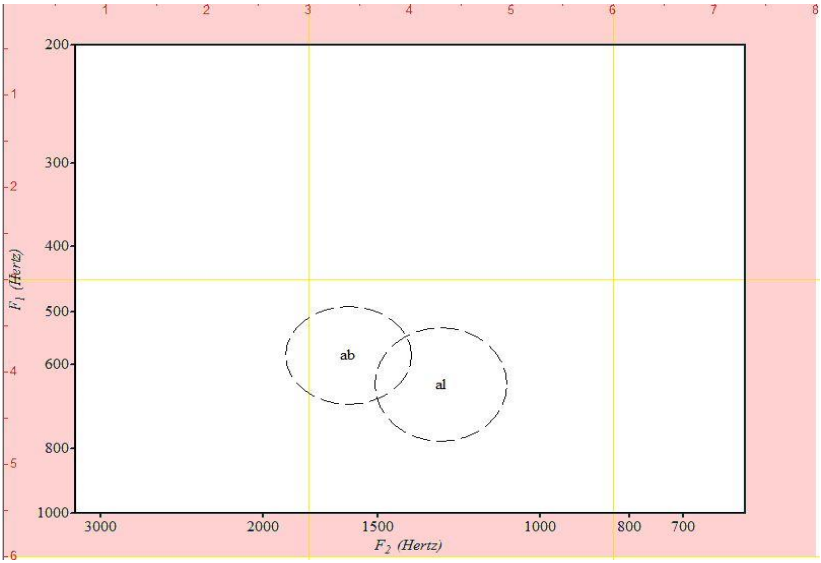

Figure 6. The mean of the unstressed vowels produced in the suffixes “able” and “al” by 20 Brazilian informants. The vowels are represented by their respective suffixes: (ab) and (al).

In Figure 6, we can see the mean of unstressed vowels in the target English suffixes produced by the Brazilian informants. In this

figure, it is remarkable how higher the vowel in the suffix "-able" is in comparison to the vowel in the suffix "-al". This difference is likely to be related to the fact that the tokens produced in the second suffix were harder to pronounce possibly more prone to L1 transfer compared to more common words present in the "-able" suffixes. Besides that, tokens containing the "-al" suffixes resembled most the Portuguese words, thus orthography might have triggered L1 prosodic patterns.

By inspecting Figure 7, we can say that both vowels tended to centrality, whereas the vowel in the suffix "-al" was a bit back possibly due to the backness feature of the coda consonant, which is most likely pronounced as [w] by the BP informants, and it was also lower. Although there is a great difference according to the suffix type, we can say that both productions show some consistency in the production of the vowels. Due to the limited number of tokens produced by the two American informants, we can neither plot their productions, nor perform statistical analysis comparing the results for American speakers and BP learners.

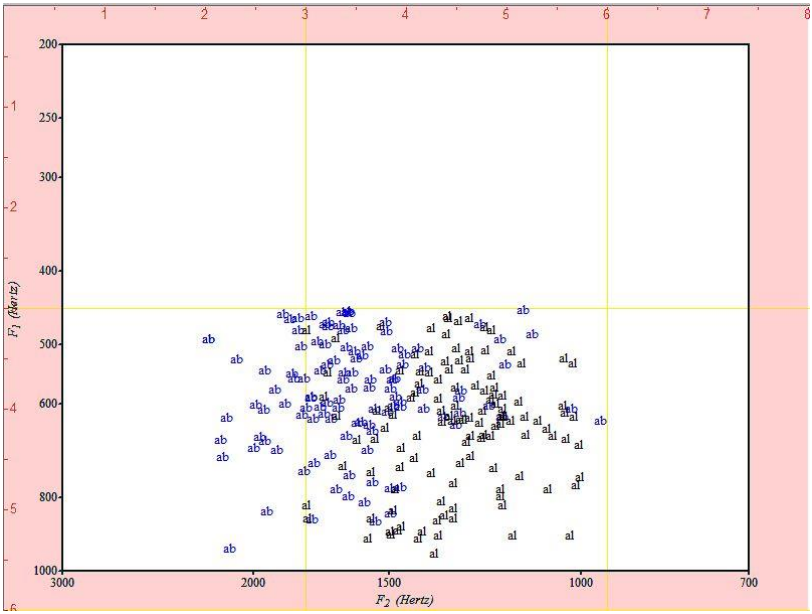

Figure 7. The dispersion of' unstressed vowels produced in the suffixes "able" and "al" by 20 Brazilian informants. The vowels are represented by their respective suffixes: (ab) and (al).

Using the BP informants' data, a statistical test, Wilcoxon, was run to compare the F1, F2 and duration results for the production of the two unstressed suffixes '-al' and '-able'. Their F1-F2 and duration values demonstrated their differences were statistically significant as ($p<0.05$) in the Wilcoxom test. Table 12 displays the details of the statistics analysis, which revealed that the BP informants produced significantly different values for the three acoustic measures when the two suffixes are compared. Whether these differences are due to the different phonological environment surrounding the suffixes and for the types of word used for each suffix remain an issue for further studies. The results displayed for the two native speakers of English hint at the important influence of the phonological environment, given that a similar pattern, especially regarding duration, displaying the vowels of the suffix as longer when compared to the BP English learners.

Table 10

Results of a Wilcoxon test run to check the differences between the production of the English /ə/ present in the suffixes "-able" and "-al"

	F1 unstressed -able F1 unstressed –al	F2 unstressed -able F2 unstressed -al	Duration -able Duration -al
Z	-2,967	-6,104	-7,686
Asymp. Sig. (2-tailed)	,003	,000	,000

5.2.3 Position of the stressed syllable and immediate contexts in the production of the English vowels embedded in the unstressed suffixes

Previously, results were described to show how 20 Brazilian informants produced the vowel "a" present in unstressed suffixes and we managed to discuss whether this production had statistical significance when the different suffixes were compared. The answer was positive, which meant that by the quality and duration values obtained in the production of these vowels, it is possible that the stress patterns of the tested words contributed to these differences. The difference across the

two types of suffixes was also noticed and fairly similar to the production of two American informants.

For all tokens containing the suffix "-able" (e.g. 'res**pec**table'), the previous syllable was stressed. This way, the amount of effort and energy to produce the target sound, which immediately followed the stressed syllable, would be certainly much smaller as shown in the literature (Watkins, 2001, and Yavas, 2011). In tokens containing the "-al" suffixes, however, the stress never fell in the previous syllable, e.g. (´**a**ffixal). Thus, we can infer that the position of the stressed syllable plays an important role in the production of English vowels, especially in terms of duration and vowel quality.

In order to illustrate the role played by stress, we refer now to test C, in which the vowel "a" in Portuguese was produced by the Brazilian informants. For this experiment, the two syllable words had their stress on the first syllable and their last syllables were always unstressed. Table 13 displays descriptive statistics of F1 and F2 values and duration for this BP data.

Table 11

Descriptive statistics for the Portuguese vowel /a/ produced by female Brazilian speakers in stressed and unstressed positions

	Mean	SD	Min-Max
F1 /a/	653	102	462-924
F2/a/	1393	263	733-1953
Duration* of /ɑ/	36	9	19-63
F1 /ɐ/	690	131	448-951
F2 /ɐ/	1563	227	995-2130
Duration* of /ɐ/	21	5	9-37

* Values of the target vowel relative relation

These results show that distinctions in producing these BP vowels are made in terms of vowel quality and duration. Regarding their duration values, results show that the unstressed syllables were produced with the expected duration of a final open syllable, 21 ms (Barbosa, 2012), despite their position would favor longer duration, whereas the mean duration of the stressed [a] was 36 which was relative longer than its unstressed counterpart. Table 13 also shows the F1 and F2 values for the production of the vowels [a] and [ɐ]. For the BP stressed vowel [a],

mean values for F1 was 653 and F2 was 1393, whereas for the final open BP unstressed vowel [ɐ], the mean of F1 values was 690, and for the F2 was 1563. These F1 and F2 values for the unstressed vowel was slightly close to those values reported of the production of the suffix "-al", F1 and F2 values of 589 and 1587, respectively, which suggests that the unstressed vowel of the English words containing the "-al" were pretty similar to the BP unstressed vowel in an open syllable.

Finally, a statistical test was run in order to confirm if the values of F1 and F2 and the duration of the BP vowels in stressed and unstressed positions were statistically significant. The test indicated that the acoustic measures of F1, F2 and duration of these vowels were statistically significant ($p<0.05$). Table 14 displays details of the statistics analysis.

Table 12

Results of a Wilcoxon for acoustic measures (F2, F2, and duration) of BP vowels in stressed and unstressed position

	F1unstressed F1stressed	F2 unstressed F2 stressed	Duration Unstressed Duration Stressed
Z	-2,711	-5,217	-9,880
Asymp. Sig. (2-tailed)	,007	,000	,000

5.3 RESEARCH QUESTION THREE: WORD FREQUENCY AND WORD FAMILIARITY FOR THE L2 TOKENS AFFECT THE ACCURATE ASSIGNMENT OF STRESS PLACEMENT AND PRODUCTION OF THE VOWELS IN THE ENGLISH NEUTRAL SUFFIXES?

As stated earlier, word frequency and word familiarity have been reported in interphonology studies as important variables which are

worth being taken into account, specially, due to the fact that EFL teachers and learners might benefit from these findings. Firstly, Table 15 displays results of word familiarity test, a 0 to 5 Likert scale administered to the 20 Brazilian informants to measure how familiar the 16 English polysyllabic cognates (production test B) were to them. This Table 15 also brings the word frequency results. Note that they are displayed in % as shown below:

Table 13

Rank of Word Frequency, Word Familiarity and Mean of correct syllable stress in %

Tokens	Word frequency – COCA	Mean of word familiarity	Accurate stress in %
medical	78895	4,75	95
criminal	28609	4,95	70
Digital	23394	5	80
radical	15777	4,45	100
acceptable	11307	4,5	95
tropical	8466	4,9	100
respectable	3146	4,55	95
adjustable	2028	4,45	90
adaptable	932	4,85	65
detectable	884	4,45	90
lexical	938	4,3	90
adoptable	74	3,45	85
contestable	52	4,75	85
collectable	24	4,65	90
affixal	18	3,15	35
suffixal	4	3,8	30
MEAN		**4,4**	**80,9**

As both familiarity and frequency were used to measure their correlation in the selected tokens present in test B, their results were expected to corroborate previous studies in which these two variables were present. Likewise, the highest results meant more familiarity and more frequency use of the words. For instance, the word “medical” obtained the highest results for word frequency (78895 occurrences = 1 in the rank of frequency in COCA (ROF_COCA)) and for word

familiarity (4,75 in the six-point Likert scale), thus better performance in assigning the stress for this particular word was expected by the informants when producing this word.

Table 14

Pearson correlation between word frequency, word familiarity and accurate stress placement

ROF_COCA	Familiarity	Accurate stress
Frequency	rho= ,590 (=.016)	rho= ,510 (p= ,043)
Familiarity		rho= ,126 (p= ,641)

For the statistical analysis, Spearman test demonstrated that the relationship between word frequency and word familiarity is positive, moderate and statistically significant (rho= .590, and p = .016). The test also demonstrated that the correlation between word familiarity and accurate stress placement is a weak correlation (rho= .120) and it is non-significant (p= .641). This weak and non-significant correlation must be due to the small sample and the fact that the participants tended to assign rates 3 and 4 to most words, which made the score range very limited for the familiarity variable. Finally, for the correlation between word frequency and accurate stress placement, the relationship is positive and moderate (rho= .510), and it is significant (p= .043). The fact that this correlation is positive indicates that the more frequent the word, the higher the percentage of accurate stress assignment. It confirms that the more contact the learner has with a polysyllabic word, the higher the chances of learning its stress pattern. This result corroborates Brawerman-Albini's (2012) study.

This study partially corroborated Gonçalves' (2014) study, in which the author investigates correlations between word frequency and word familiarity, correlations between word familiarity and intelligibility, and correlation between word frequency and intelligibility. In his study, correlation between familiarity and frequency were strong and significant, thus providing evidence that the familiarity and the frequency measure could be used interchangeably. However, the present study does not provide evidence that word familiarity can predict performance on a stress placement test with suffixed words, probably due to problems in measuring familiarity.

Having presented the results for the three research questions that guided this study, the next chapter brings the concluding remarks.

CHAPTER FIVE
CONCLUSION

The objective of this chapter is to summarize the main results and findings presented and discussed in Chapter 4 as well as provide some pedagogical implications, study limitations and suggestions for further research. It is organized in three sections. Section 5.1 reports the main findings obtained from the data analysis. Section 5.2 includes some discussion on pedagogical implications of this thesis, and Section 5.3 brings the major constraints of this study and offers suggestions for further research.

6.1 SUMMARY OF OVERALL RESULTS

After setting this objective, three research questions grounded this research: (1) How do Brazilian informants stress the English polysyllabic cognate words whose neutral suffixes are not meant to carry stress? (2) RQ2: How do Brazilian informants produce the English mid-central vowels embedded in suffixes attached to the English polysyllabic cognate words? (3) How do word frequency and word familiarity for the L2 tokens affect the assignment of stress and production of the vowels in English neutral suffixes? Having this in mind, therefore, the main findings related to the three research questions previously reported will be summarized in this section.

For the first research question, it was demonstrated that the BP learners' level of proficiency (intermediate and upper intermediate) could not predict informants' performance with stress placement of polysyllabic words in reading. The correlation between proficiency test scores and percentage of accurate stress placement revealed to be weak (*rho* = .40), non-significant correlation (p = .085). This meant that informants from both proficiency levels had similar rates of accurate stress placement to the suffixed polysyllabic words, different from what was predicted by Garcia (2012), who suggested that these types of neutral suffixes should not represent problems for BP learners with these

levels of proficiency. However, it is important to bear in mind that the small data sample and small set could have influenced this result.

Another possible reason for this non-significant result was that the English suffixes tested in the present study (-able, -al) never carry stress, whereas their Portuguese counterparts do (Bisol, 2010). Thus, it was suggested that the L1 influenced a great deal the assignment of stress in the L2. Therefore, it was noticed that intermediate level BP learners of English might face difficulties when acquiring some suprasegmental aspects of the L2 speech.

Before addressing the production of the unstressed English vowel embedded in the English suffixes, we described the production of the stressed and unstressed English vowels in test A, which contained non-suffixed English words, in order to check how different the English vowel in stressed position /ʌ/ and the unstressed vowel /ə/ were. Vowel quality and duration values were taken into account, as these were the acoustic features the variables chosen to analyze these vowel productions. Statistical analysis demonstrated that these English stressed and unstressed vowels differed in terms of vowel quality and duration values ($p<0.05$). This distinction seems to be because the acoustic feature (duration and F1-F2) produced by BP learners of English were similar to the pattern observed for American informants' values in the present study. Furthermore, data from production test C showed that the BP learners also produce vowels with different acoustic quality for words with the vowels spelled with the letter 'a' in unstressed and stressed positions. This result confirms that Brazilians keep a contrast between stressed and unstressed syllables in their L1, and that this contrast is carried over to L2 productions as well.

With the objective to study how the stressed and unstressed BP vowels, orthographically spelt with "a" as in "t**a**p**a**' offer some explanation for the English vowels in stressed and unstressed positions, results of the F1 – F2 and duration values for these BP vowels were described as having distinct vowel quality and duration. This was confirmed by the statistical analysis, which indicated that the F1 stressed and unstressed were significant (p. = .000), their F2 stressed and unstressed were also significant (p. = .000) and regarding duration for the BP stressed and unstressed vowels, duration of these vowels were statistically significant ($p<0.05$), (p = .000).

To discuss the second research question, which looked at vowel quality and duration values in the production of the unstressed English vowels in test B, special attention was given to the results obtained in

the production of the English stressed and unstressed vowels, because it helped us understand that the productions vary immensely. However, they still differed in terms of duration and vowel quality.

These differences were also demonstrated in the production of the two types of neutral suffixes "-al" (closed syllable) and "-able" (open syllable) due to the fact that features as voicing of the preceding consonant and the acoustic quality of the following consonants are believed to interfere to vowel duration and vowel quality as seen in Yavas (2011). The results and statistical analysis showed statistical significance between the production of the two unstressed suffixes '-al' and '-able'. Thus, the difference between "-able" and "-al" F1 values was significant (p= .003), and their F2 values was likewise significant (p. = .000). Also, the results demonstrated that duration of these two unstressed vowels were statistically significant (p= .000).

The phonological context is commonly addressed as an important variable to control when approaching a vowel production. Phonological contexts gain even more importance when word stressing is involved, as stated in Yavas (2011) and highlighted in Watkins and Rauber (2010). Taking phonological context into consideration, the results indicated that the 20 BPSE informants produced the English vowel "a" in the unstressed suffixes with statistical significance. It is worth pointing out that this difference was also noticed and was fairly similar to the production of two American informants.

At last, it was shown in the previous chapter how the variables word frequency and word familiarity would predict the assignment of stress in English polysyllabic words analyzed in this study. Spearman tests were run and they indicated that word frequency and word familiarity had strong correlation and could similarly predict stress placement. Correlation for word frequency and word familiarity was reported as moderate (rho= .590) and statistically significant (p= .016). However, correlations between word familiarity and accurate stress placement was reported as a weak correlation (rho= .126) and non-significant correlation (p= .641). It was inferred that this weak and non-significant correlation was due to the small sample. Finally, it was reported that correlation between word frequency and accurate stress placement demonstrated moderate correlation (rho=,510), results proved their correlation was significant (p= .043), though.

6.2 PEDAGOGICAL IMPLICATIONS

Based on the findings of this study, it is possible to see that English stress placement poses production difficulties to intermediate and upper-intermediate BP learners. On the other hand, production of unstressed English vowels seems to be less of challenge, given the fact that these learners also produce a different vowel in terms of F1, F2 and duration values when the BP central vowel appears in stressed and unstressed positions, and are able to do the same in English, despite not producing a vowel with the same acoustic properties displayed by native speakers of English.

Furthermore, the fact that more frequent words displayed higher rates of correct stress assignment reinforces the importance of language use as a factor that contributes to the learning of lexical stress patterns. Thus, language classroom should be a place where learners are in constant contact with the target language and have varied opportunities to use it in order to understand its pronunciation patterns. However, as the correlation between word frequency and accurate stress is moderate, the results indicate that frequency cannot account for all variation in the data. Words containing more difficult syllabic patterns, such as the polysyllabic words with stress on the fourth syllable before the last, as revealed in this study, should be explicitly taught in the language class. BP learners of English might benefit from this kind of explicit instruction to perceive that this type of syllabic pattern is possible in the L2 and to learn how to monitor their production of polysyllabic words that have this particular stress pattern.

6.3 STUDY LIMITATION AND SUGGESTIONS FOR FUTURE STUDIES

This study aimed to investigate stress placement and vowel production of unstressed English vowels present in polysyllabic suffixed words by looking at the production of undergraduate English students at the State University of Bahia. Despite the fact that its findings indicated statistical relevance to some of the tests, a larger sample and different informants' gender would be more adequate, so that duration and F1-F2 values could be compared to previous studies. Another limitation of this study was the fact that sentence and word list data was used, and this type of stimuli can yield different results when compared to free speech data.

Thus, further research that investigates stress placement and unstressed vowel is needed. It would be interesting for future research to take into account both production and perception. Moreover, the familiarity measure used in the present study seemed problematic because the students tended to assign only two types of ratings to the target words, which made it difficult to check the extent to which word familiarity (i.e., learners' judgements about how familiar a word is for them) can predict stress accuracy. Further studies should be more careful with the selection of words and maybe even test pseudo-words to have a clearer understanding of the role played by word familiarity (and even word frequency) in the assignment of word stress. Finally, a deeper and more detailed study of the BP variety spoken by the informants in the region this study was carried out appears to be necessary.

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APPENDIXES

APPENDIX A – PRODUCTION TEST A – ENGLISH SENTENCES

1. Read the following sentences in a speech rate as natural as you can. You may read one sentence more than once, if you think it is necessary.

1. Everyone agrees that an apple a day keeps doctors away.
2. I travelled to South Africa, Congo and Uganda by myself.
3. That umbrella belongs to Jessica Park.
4. I think Canada is larger than the United States of America and Brazil.
5. There is a gorilla in the picture above.
6. Some people can't dance the samba.
7. The words 'but' and 'cut' sound like 'hut'.
8. I wish I could travel to Tampa – Florida one day.
9. I am taking yoga classes once a week.
10. The words 'love' and 'dove' sound like 'glove'.
11. In Canada, one can listen to many indigenous languages apart from English and French.
12. Some of the greatest loving songs were written by men.

APPENDIX B – PRODUCTION TEST B – ENGLISH WORDS CARRYING THE UNSTRESSED SUFFIXES

2. Read the following list containing English words. Each word should be read TWICE and if you think it is necessary due to any interruption, you may record any word one more time.

English Words
1. tropical
2. Suffixal
3. Radical
4. Medical
5. Lexical
6. Digital
7. Criminal
8. Affixal
9. Respectable
10. detectable
11. contestable
12. collectable
13. adoptable
14. adjustable
15. adaptable
16. acceptable

APPENDIX C – PRODUCTION TEST C – PORTUGUESE SENTENCES CONTAINING STRESSED AND UNSTRESSED VOWELS “A”

3 - Read the following sentences in a speech rate as natural as you can. You may read one sentence more than once, if you think it is necessary.

a. Em cápa e táta temos a.

b. Em cáta e páta temos a.

c. Em cáta e táca temos a.

d. Em páca e pápa temos a.

APPENDIX D – WORD FAMILIARITY TEST FOR THE ENGLISH WORDS

3. Classify the English words below from 0 to 5 by ticking (√), being 0 = *I don't know this word,* and 5 = *I know this word and it is very familiar to me*.

Word Familiarity						
	0	1	2	3	4	5
a. tropical						
b. suffixal						
c. radical						
d. medical						
e. lexical						
f. digital						
g. criminal						
h. affixal						
i. respectable						
j. detectable						
k. contestable						
l. collectable						
m. adoptable						
n. adjustable						
o. adaptable						
p. acceptable						

APPENDIX E – QUESTIONNAIRE FOR BRAZILIAN PARTICIPANTS' BIOGRAPHICAL

(Adapted from Gonçalves thesis proposal, 2014**)**

Dear participant,
The present questionnaire seeks to obtain information to be used in the data analysis of this present study. Neither your identity nor information which may reveal your identity are to be published. You are required to inform your name and your e-mail address so as the researcher can get in touch with you if further information is needed.

Roberto R. Bueno

Part I – Personal Information

1. Name:

2. Age:

3. Where were you born? (city and state)

4. Where do you live at the moment?

5. Where did you live most of your life and for how long?

6. Have you ever lived abroad?
   Yes □ No □
   If your answer is "yes", where and for how long was it?

Part II – Language Knowledge

a. Do you speak other foreign languages?
Yes □No □
If your answer is "yes", what is it/are they? How well do you speak it/them?

b. How often do you speak English?
Always □ Sometimes □ Hardly ever □
Never □

c. How well do you speak English?

Very well □ Fairly well □ Not well □ Not at all □

d. How well do you understand English?
Very well □ Fairly well □ Not well □ Not at all □

e. How old were you when you started studying English?

f. For how long have you been studying English at University?

Signature: _____, ____/____/____
E-mail address: _____

APPENDIX F - TERMO DE CONSENTIMENTO PARA AS PARTICIPANTES BRASILEIRAS

(Elaborado de acordo com a Resolução 466/2012-CNS/CONEP)

Universidade Federal de Santa Catarina
Centro de Comunicação e Expressão
Programa de Pós-Graduação em Inglês: Estudos Linguísticos e Literários
Aluno: Roberto Rodrigues Bueno
Orientadora: Doutora Rosane Silveira

Eu, Roberto Rodrigues Bueno, sob a orientação da professora Rosane Silveira, da Universidade Federal de Santa Catarina, convido a todos para participarem da pesquisa intitulada "*Acentuação e redução vocálica de sufixos em palavras polissilábicas do inglês por aprendizes brasileiros*".
Sua participação será através de (i) responder um teste de proficiência *on*-line com o objetivo de termos uma avaliação mais acurada do nível de proficiência de cada participante; (ii) assinar o presente termo de consentimento para assegurar seus direitos por conta do uso de seus dados coletados; (iii) responder o questionário que visa à obtenção de dados relacionados ao percurso de aprendizado de língua estrangeira de cada participante; (iv) ler uma primeira lista de sentença em inglês a fim de serem gravadas para análise futura; (v) ler uma lista de palavras em inglês a fim de serem gravadas para análise futura; (vi) responder ao teste de familiaridade para investigar se o conhecimento do vocabulário representa alguma diferença no resultado final referente à acentuação ou à produção vocálica; (vii) ler uma segunda lista de sentenças em inglês a fim de serem gravadas para análise futura; e (viii) ler uma lista de sentenças em português a fim de serem gravadas para análise futura. Para isso, este pesquisador se compromete a assegurar os seguintes requisitos:
· O cumprimento das determinações éticas da Resolução nº466/2012 CNS/CONEP;
· A garantia de todos os participantes de solicitarem e receberem esclarecimentos antes, durante e depois do desenvolvimento da pesquisa;
· A mais ampla garantia que as identidades de todos os participantes serão preservadas e nenhuma das atividades colocará em risco a

integridade física e mental dos participantes por participarem dessa pesquisa;
· No caso do não cumprimento dos itens acima, os participantes terão a liberdade de pedirem a não inclusão ou mesmo a não continuidade de sua participação (em caso da pesquisa em andamento) a qualquer momento da pesquisa sem penalização alguma.
Peço que assine o espaço abaixo se estiver de acordo com as especificações expostas acima:
Eu, _____, concordo em participar deste estudo e autorizo o pesquisador a utilizar os dados por mim fornecidos.

_____, ____ / ____/ _____

_____
_____

Assinatura do Mestrando Assinatura da Orientadora

Florianópolis, ____ / ____/ ____